VOLUME I. OCTOBER, 1915. No. 4

Journal
of the
Royal Naval Medical Service.

Original Articles.

REPORT ON CEREBRO SPINAL FEVER IN THE ROYAL NAVY (AUGUST, 1914—AUGUST 1915)

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The cases of cerebro spinal fever in the Royal Navy from August, 1914, to July 31, 1915, have been investigated by order of Sir Arthur May, K.C.B., Director General, with the main object of determining what measures should be adopted to prevent or minimize an epidemic outbreak of this disease in the coming winter of 1915-1916. The enclosed report contains—

(I) A discussion of the etiology of the cases.
(II) A history of the outbreaks at various centres.
(III) A summary of the rarer manifestations and complications.
(IV) A summary of the results of treatment.
(V) Recommendations as to prevention (i) of the disease and (ii) of its spread.

(I) ETIOLOGY OF THE CASES.

The cases of cerebro spinal fever in the Royal Navy amount to 170, of which 90 or 52·9 per cent., proved fatal.

Incidence.—The cases naturally occurred mainly where large numbers of ratings were collected.

There were 33 cases at the Crystal Palace, 21 cases at the Royal Naval Barracks, Chatham; 26 cases were traced to Deal; 16 occurred in the Royal Naval Barracks, Portsmouth, which at the time was not

over crowded there were 10 cases at the Royal Naval Barracks Devonport 12 cases at the Royal Marine Artillery Barracks, Eastney, and 10 cases in the "Impregnable"

In some instances, however large numbers of men were collected together without a corresponding incidence of the disease

At Blandford although drafts from infected centres (the Crystal Palace and Deal) were received, six cases only occurred, three of which were in the Deal Battalion, which was isolated from the rest of the camp until February 20, between February 1 and 4 or shortly after their arrival from Deal and must therefore be regarded as having originated at Deal At the Royal Marine Light Infantry Barracks, Forton, no cases really originated although four cases were borne on the books On the 'Powerful' there were two cases only both on April 10, when there were 600 boys

The disease may occur in sudden outbursts, so as to suggest a virulent focus or the presence of carriers inside a barracks, or may crop up in an intermittent or isolated fashion, so as to point to infection contracted outside

Thus at Deal 13 cases occurred between January 19 and February 4, and no cases after March 14 In the "Impregnable" 5 cases occurred between February 8 and 13, and none between February 24 and May 30 At Eastney 4 cases 3 of which could be traced to a probable source of infection in the barracks occurred between January 18 and 20

On the other hand, at the Royal Naval Barracks, Portsmouth, 16 cases occurred in six months (January 27 to July 31), the most in any one month (March) being 4 In addition 2 men went sick with the disease shortly after leaving the barracks

In the Royal Naval Barracks, Chatham the cases occurred in such continuity from January 27 to March 17 as to suggest an internal origin, after that date there were 3 cases only, and of these 2 could be traced to outside infection At the Royal Naval Barracks, Devonport, there were 7 cases between February 12 and March 4, and then no more until infection was introduced from outside on March 21 Twelve cases occurred in sea going ships and in one instance only did two cases occur in the same vessel (the "Barrosa")

The monthly incidence with the results is shown below The largest number of cases and of deaths occurred in February —

Month	Cases	Deaths	Invalidings	Recoveries
November	1	0	1	0
December	2	1	0	1
January	27	15 or 53 per cent	1	10
February	60	18 35 ,,	1	24
March	35	16 45 6 ,,	3	17
April	24	8 ,, 33 4	0	16
May	12	6 ,, 50 ?	1	3
June	6	4	—	2
July	1	3	—	—
	170	90		

The Question of the Communicability of the Disease—It has been authoritatively stated that a very definite feature of epidemics of cerebro spinal fever is the isolation or want of ascertained contact between the cases of the disease, and it has even been suggested that it is not more communicable than pneumonia, and in this connexion the extreme rarity of infection of medical officers and nurses in hospital might be mentioned This is an important point, for if the etiology of the disease is on the same plane as that of pneumonia it would not be worth while to attempt isolation of meningococcic carriers.

Out of the 170 cases some evidence of infection was traced in 59, or rather more than a third, this is by no means convincing proof of the communicability of the disease but it should be stated that the opportunities for tracing the infection, which appears to be largely conveyed by carriers, varied in different places, especially as to contact with carriers At Chatham infection was traced in 12 out of 24 cases, whereas among 33 cases at the Crystal Palace the infection was traced in 8 only, and among 20 cases at Deal a connexion was forthcoming in three instances only It is obvious that the more the cases can be investigated the larger the number in which the source of infection is traced

The following points noticed among the cases in the Navy are in favour of the view that the disease is spread from one individual, either suffering from the disease or a carrier, to another

(1) Spread of the disease from an infected focus —A draft of men of the Naval Brigade from Deal carried the disease to the camp near Blandford, where at least one man, who was in billets and went sick appeared to have communicated the disease to a civilian living in the house In Portsmouth where there was one civilian case in 1914 as contrasted with sixty two in 1915 up to June 22, the first civilian case was in a child aged 4½ years on February 11, who attended the Royal Naval Artillery School, Eastney in which recruits were also taught By this time six recruits from Eastney had gone down with cerebro-spinal fever, the last on February 9 During the following eight days four other children of about the same age in the neighbourhood of Eastney became infected

(2) The way in which outbreaks appear to be stopped by isolation of contacts and mild disinfection of the throat

In the 'Impregnable' 5 cases occurred between February 8 and 12 on the two following days 123 contacts were removed to the Royal Naval Hospital, Plymouth, and of these 31 were found to be carriers, 2 of which

developed the disease on February 15 and 19 respectively. On February 19 a boy on leave developed the disease, but otherwise no case could be traced to the 'Impregnable' until a boy, who left that ship on April 3, developed the disease on the following day in the Royal Naval Barracks, Portsmouth. On April 10, 2 cases of cerebro-spinal fever occurred in the 'Powerful' in a mess where a carrier was afterwards found, who, fifty-six days previously had had influenza in a severe form (possibly cerebro-spinal fever) at Liverpool. Fifty-five contacts were segregated (15 carriers), and no further cases occurred. At the Royal Naval Barracks, Chatham, 5 cases occurred among the engine-room artificers, between February 1 and March 17, 130 men were examined, 30 of these had nasal or laryngeal catarrh, and of these 3 were found to be carriers and were isolated. After this no more cases occurred among the engine-room artificers. At Deal all the men using the swimming bath sprayed their throats with a mild antiseptic before bathing and no case occurred after March 14.

(3) The difference between the incidence of the disease in barracks and institutions in the same port.

In the Portsmouth district at the Royal Marine Light Infantry Barracks, Forton no case originated (although 4 cases were borne on the books), whereas at the Royal Marine Artillery Barracks there were 10 cases at least, and at the Royal Naval Barracks, Portsmouth 16 cases. On the hypothesis that cerebro-spinal fever is not more infectious than pneumonia its incidence, other things being equal, should be in proportion to the number of men in the respective barracks, namely, the Royal Marine Light Infantry Barracks, 1, the Royal Marine Artillery Barracks $1\frac{1}{2}$, the Royal Naval Barracks Portsmouth $5\frac{1}{2}$. This proportion was not shown for at the Royal Marine Artillery Barracks, Eastney, where there was, as already mentioned, an outburst of cases suggesting an internal focus of infection; there was relatively a great excess over the other two. At the Royal Naval College, Osborne, no case has occurred.

(4) The detection of carriers who have been in contact with cases of the disease and have formed a bridge between them. This was shown to occur in several instances at the Royal Naval Barracks, Chatham, by Deputy Surgeon-General C. J. Mansfield, M.V.O.

The experience of the cases of cerebro-spinal fever in the Navy is therefore in favour of the usually accepted opinion that the disease is communicable, and that precautions to prevent infection are necessary.

The spread of the disease depends in the first instance on infection from (*a*) carriers, (*b*) abortive and undetected cases, (*c*) patients recognized to be suffering from the disease. The first two are the most important, whereas the last is so obvious as not to require discussion. An attack of the disease, however, may be

followed by a chronic carrier state, which may possibly be periodic or intermittent, with positive and negative bacteriological results alternating

A case of cerebro spinal fever at the Crystal Palace had been in contact with a man who after recovering from the disease had returned to duty on bacteriological examination he was found not to be a carrier (*vide* p 394) in this instance the spread of infection was not proved, but possibly he was a periodic carrier In September, after the period covered by this Report, an outbreak of three cases of cerebro spinal fever among boys in the Royal Naval Barracks, Portsmouth was traced to a boy who had recovered from the disease and returned to duty bacteriologically he was proved to be a carrier (Fairer)

(*a*) *Carriers*—This is a most important and difficult question in connexion with the spread of the disease. If carriers could be entirely eliminated the disease would be abolished, and the pro phylaxis of cerebro spinal fever is largely concerned with the detection, isolation and sterilization of carriers (*vide* p 404 *et seq*) It is probable that under conditions which depress their resistance carriers would be become attacked by the disease, and this reasonable assumption would explain the occasional occurrence of very long incubation periods.[1] It is therefore remarkable how rarely known carriers contract the disease, among 170 cases of cerebro spinal fever there were 3 or 1 7 per cent, in recognized carriers under treatment, these 3 cases occurred among the 227 carriers detected around 120 cases or a percentage of 1 3 The importance of carriers is therefore mainly that they may convey the disease to others

The difficulties lie in (1) the detection of healthy carriers, this could only be attempted by the examination of every man in the Service and as the carrier state is usually of short duration (about three weeks), and as some carriers are intermittent, showing the presence and absence of meningococci alternately the work thus involved would be prohibitive

(2) The discrepancy as to the numbers of carriers among contacts Thus some authorities, for example Flügge, have found that as many as 70 per cent of close contacts are carriers, while others have estimated the percentage as low as 7 (von Lingelsheim) In the Navy the results have varied considerably, this probably depends on the employment of different standards in the bacterio logical diagnosis at various centres

[1] The French memorandum states that the incubation period may be as long as thirty six days (*vide Brit M d Journ*, 1915 i, p 921)

At Plymouth, out of 402 close contacts 97, or 24 per cent, were positive, and out of 1,056 remote contacts 74, or 7 per cent, were positive (Whiteside) At Deal among 97 close contacts 16 were positive, while of 35 remote contacts none were positive (E A Shaw) Out of 122 close contacts from the Crystal Palace 12 or 9 per cent, were positive (Bassett Smith) At Chatham, out of 243 who were sleeping next to or in the same mess as a case of cerebro spinal fever 20, or 8 5 per cent were positive (Dudley) At Portland, out of 58 close contacts 5 or 8 6 per cent, were positive (Shand and Hitch) Out of 222 close contacts examined at the Royal Naval Hospital Haslar, there were 2, or 0 9 per cent, positive (Dudding)

(3) The present state of our knowledge as regards the morphology of the infective agent of cerebro spinal fever It has recently been suggested that the meningococcus is only a phase in the cycle of a pleomorphic micro-organism which causes the disease[1] If so, this would bear on the failure to recognize carriers and so to limit the spread of the disease

(4) The possibility that the disease may be conveyed by carriers other than human beings such as lice, fleas and other parasites, the virus passing direct into the circulation, is at present hypothetical, but it is worth consideration from the point of view of prophylaxis

(*b*) *Abortive Cases*—The existence of such cases is likely to be detected only when an epidemic is in progress, at other times they may be regarded as "influenza" or 'catarrh' Such cases may occur among those in contact with the sick, and their occurrence among relatives nurses, and medical attendants should be borne in mind The first or catarrhal stage of cerebro-spinal fever may be prolonged, and during this period be indistinguishable from influenza some of the cases in the Navy have been of this nature and have been instrumental in spreading the disease

At the Crystal Palace three cases occurred among the Public Schools Battalion between February 10 and 14 one of them had been ill with catarrh since January 28, and among his contacts three positive cases were found

The disease may abort in the catarrhal stage, and these cases are more active in the spread of the malady than the cases which run the characteristic course and are therefore isolated

A man in the Naval Brigade at the Crystal Palace went sick with what was thought to be influenza on March 16 He went home, and subsequently his wife and child died of cerebro spinal fever On

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[1] Hort, Lakin and Benians *Brit Med Journ* 1915 vol i pp 541 715

March 31 he was admitted to the Croydon Hospital where he was regarded as a case of cerebro spinal fever although lumbar puncture was not performed

The coincidence of a high sick rate of catarrhal affections (influenza, catarrh, tonsillitis sore throat) with the occurrence of cases of cerebro spinal fever has been noted in several though not in all instances, and it may be pointed out that not only may catarrhal affections dispose to meningococcic infection but that some patients regarded as "catarrh or 'influenza may be abortive cases of cerebro-spinal fever

Conditions which may favour the Spread of the Disease—(1) Overcrowding is a recognized factor in favouring the outbreak of the disease It appears to act by increasing the number of carriers, and probably by spreading other diseases, such as influenza and catarrh which weaken the patient s resistance and thus favour the carrier state or virulent meningococcic infection

In connexion with the influence of overcrowding on the incidence of cerebro spinal fever attention may be drawn to the Royal Naval Barracks, Devonport where twelve out of the fifteen cases of the disease occurred in the blocks with the lowest cubic space (*vide* p 390)

The danger of overcrowding must not be estimated solely in terms of cubic space, for in summer when men are more in the open and are less tempted to circumvent proper ventilation, over crowding is less productive of cerebro-spinal fever than in winter Overcrowding to an extreme degree may occur without cerebro-spinal fever, provided infection is obviated. Thus in both the "Powerful' and the "Impregnable' there is great overcrowding, but in both, on the appearance of the disease, isolation of contacts and removal of carriers were followed by stoppage of the outbreak Conversely an outbreak may occur in the absence of overcrowding, thus at Eastney five cases occurred between January 15 and 20, when the number of men was considerably under the full complement

(2) Catarrhal affections—catarrh, influenza, tonsillitis, and sore throat—were numerous during the early months of 1915 and their prevalence roughly coincided with the outbreak of cerebro-spinal fever The greater prevalence of catarrhal affections in the first quarter of 1915 as compared with the first and last quarters of 1914, as shown at Deal and Shotley, suggests some connexion with the cerebro spinal epidemic

In some barracks and establishments the maximal incidence of

cerebro-spinal fever occurred in the month during which catarrhal affections were most numerous

At the Royal Marine Artillery Barracks, Eastney, both catarrhal affections and cerebro-spinal fever were at their maximum in January, at the Royal Naval Barracks, Chatham and the Crystal Palace, and in the "Impregnable" they occurred in February

At these centres there was some evidence that carriers existed among the occupants, and it is therefore justifiable to suggest that the prevalence of catarrhal affections favoured the carrier state and facilitated infection In support of this contention it may be mentioned that at the Royal Marine Light Infantry Barracks, Forton, catarrhal affections were few and no cases of cerebro-spinal fever originated in the barracks In the "Powerful," where two cases only occurred on April 10—a month which had a small incidence (68) of catarrhal affections as compared with the preceding month (March having 136 the highest for the first half of the year)—15, or 27 per cent, carriers were found among 55 contacts, at first sight it might appear that these circumstances militate against the view that a high incidence of catarrhal diseases favours the carrier state But reflection shows that as the two cases and the detection of carriers occurred early in April the influence of the high incidence of catarrhal diseases in March was still active

In the Royal Naval Barracks at Portsmouth and Devonport, there was no exact relation between the incidence of catarrhal diseases and of cerebro-spinal fever In both of these instances there was a dearth of evidence of a focus of infection inside the barracks, and it is perhaps reasonable to suppose that the cases were mainly introduced from without

In conclusion, there appears to be a relation between the incidence of catarrhal affections on the one hand and of cerebro-spinal fever cases on the other.

(3) Age incidence In civilian practice cerebro-spinal fever is pre-eminently a disease of childhood and adolescence Among the 170 cases in the Navy, 103, or 60·6 per cent, occurred under 20 years of age, and the number of cases progressively diminished in each successive decade while the mortality percentage rose This is shown in the following table —

Age periods	Number of cases and percentage of the total 170 cases	Deaths and percentage in the age periods
15—19	103 or 60·6 per cent	45 or 43·7 per cent.
20—29	43 25·3	27 , 62·8 ,
30—39	13 7·6	10 76·9 ,,
40—49	8 4·8 ,,	6 ,, 75·0 ,,
50—59	3 , 1·7 ,,	2 ,, 66·7 ,,

It must be remembered that there was a very large number of young recruits in the Navy and that there are probably special factors at work which dispose them to cerebro-spinal fever.

(4) Recent enlistment. Newly joined recruits were specially attacked by the disease.

At the Royal Naval Barracks, Devonport, there were 10 cases of cerebro-spinal fever, of these 1 had been in the Service over a year, and the remaining 14 were recent recruits with an average of thirty days' service. Of 21 cases at the Royal Naval Barracks, Chatham, 11 were recent recruits with an average service of twenty four days (7 with less than twenty days' service and 1 with eighty eight days' service).

Youth is generally recognized as a factor favourable to the incidence of cerebro-spinal fever; but in addition the following factors lower the vital resistance of recent recruits: (*a*) Depression and home sickness comparable with that of a boy during his first term at school. (*b*) Vaccination on entry and antityphoid inoculation in the Naval Brigade. (*c*) fatigue and over-exertion due to drills and marches. The effect of fatigue was shown in the Deal Battalion which left Deal on January 24 to march to Maidstone, stopping the first night at Littlebourne, the second at Charing, and the third at Boarstall; the next day (January 27) three men went sick with cerebro-spinal fever at Maidstone. The battalion then went by train to the camp near Blandford, where three more men went down with the disease on February 1, 3, and 4.

In the following case investigated by Fleet Surgeon R. Hill, C.V.O., the three factors—overcrowding, the depressing effect of antityphoid inoculation, and fatigue—were all present. A private, aged 19, who occupied a room with 250 cubic ft. of space in Upper Walmer was inoculated against typhoid fever on February 23, 1915; next day although feeling out of sorts, he did a hard day's work, and at 7 p.m. went by train to Sandwich, where there had recently been an outbreak of cerebro-spinal fever. On February 24 he felt ill and stayed in bed, and on the following day was delirious, and found to have cerebro-spinal fever.

(5) Meteorological conditions might naturally be expected to exert some influence on the incidence of cerebro-spinal fever. Thus east and north winds, and a low atmospheric temperature or a sudden fall of temperature, might by reducing the resistance to bacterial invasion, lead directly to incipient infection, or by favouring other infections of the nose, pharynx, dispose to the carrier state. During the epidemic it appeared to many medical officers that cases came under observation in connexion with a cold snap, and were less frequent when the weather was warm and calm. It therefore seemed worth while to investigate the relation, if any,

between the direction of the wind and the daily temperature, on the one hand, and the occurrence of cases of cerebro spinal fever on the other It may be said at once that the results do not justify any definite conclusion

In the first instance the monthly incidence of cerebro-spinal fever was compared with the prevailing winds and it appeared that there was some evidence to support the preconceived view that northerly and easterly winds favour the occurrence of the disease At Portsmouth, Plymouth and Deal cases of the disease followed in the wake of north and east winds, but at Chatham no decided conclusion as to the influence of winds was forthcoming The direction of the wind on (*a*) the day of onset of the disease and (*b*) on the three previous days was then plotted out for 93 cases occurring at Portsmouth, Plymouth, Chatham and Deal On the actual day of onset the wind was more or less east or north in 50 cases and south west, or calm in 13 On the three days before the onset of the disease the wind was more or less east or north in 47 south or west in 35 and in 11 cases varied during the three days On the whole, there is not sufficient evidence that east and north winds play an important part in causing an outbreak of the disease

The question of the atmospheric temperature was gone into In some, but not in all instances, the months with the lowest average daily temperature showed the largest number of cases of the disease, but the difference in the average daily temperatures was so comparatively small that no conclusion as to its influence is justified

In the Portsmouth district the larger number of cases occurred in January (T — 46° F) and March (T — 46° F), and fewer in February (T — 49° F) and April (T — 54·4° F) At Chatham more cases were seen in February (T — 38° F) than in January (T — 40° F), March (T — 43° F) or April (T — 49° F) At Deal 7 cases occurred in January (T — 44·4 F) 10 in February (T — 45° F) and 3 in March (T — 48° F) At Plymouth, however, no such relation existed

As a sudden fall of temperature might reduce the vital resistance to infection this question was investigated The temperatures (day and night) for three days before the onset of the disease in 93 cases from Portsmouth, Plymouth Chatham and Deal were examined in order to see if there was a sudden fall of temperature of 10° F or more within this period Out of the 93 cases there was such a fall in 37 only and not in the remaining 56 There is, therefore no reason to believe that a sudden fall of the atmosphere temperature causes an immediate outbreak of the disease

Finally an enquiry was made as to the relation between the

prevailing wind and the average daily temperature combined and the incidence of cerebro spinal fever Consideration of the monthly incidences of 82 cases of cerebro-spinal fever with the prevailing winds and the average daily temperature for January to March at Portsmouth, Plymouth Chatham and Deal shows that practically half the cases occurred in February during which the prevailing wind was south west and the average daily temperature 43 5° F, whereas in January the wind was west or south-west in the first half and north or north east in the second half, and the average daily temperature 43 7° F, in March the prevailing wind was north east and the average daily temperature 45° F There is not therefore, any real evidence that north and east winds and a low atmospheric temperature play a causal part in the outbreaks of cerebro spinal fever

January 29 *Cases*

Portsmouth	10 cases	The coldest month there (40 6° F)	prevailing wind	1st half W & S W
Deal	7	(44 4 F)		
Chatham	1	not the coldest month there (40 8° F)		2nd half N & N E
Plymouth	0	(45° F)		

February 40 *Cases*

Chatham	9 cases	the coldest month there (38 5 F)	prevailing wind S W
Plymouth	17	cold month there (41 8 F)	
Portsmouth	4	not the coldest month there (39 F)	
Deal	10	(45 F)	

March 22 *Cases*

Plymouth	1 cases	cold month there (43 8 F)	prevailing wind	N E
Chatham	5	not the coldest month there (42 1 F)		S W
Portsmouth	11	(37 1 F)		N E
Deal	3	(45 1 F)		

(II) HISTORY OF THE OUTBREAKS OF CEREBRO SPINAL FEVER AT VARIOUS CENTRES

The Portsmouth District[1]

The 36 cases treated in the Royal Naval Hospital Haslar were drawn from the Royal Naval Barracks Portsmouth (16 cases) the Royal Marine Artillery Barracks Eastney (12 cases) the Royal Marine Artillery Barracks Forton (4 cases) and 4 isolated cases from the "Excellent, the 'Vernon and the Tregard respectively[2]

[1] A report on 31 cases treated in the Royal Naval Hospital Haslar was made by Staff Surgeon B S Rob rts R N and Temporary Surgeon L Pearce Gould R N in the Journal of the Royal Naval Medical Service 1913, vol i No 3 pp 350 359

[2] One case admitted on March 1 to Haslar from the Royal Naval Barracks, Portsmouth with German measles developed cerebro spinal fever on March 10 as the naval officer who attended the patient also looked after the cerebro-spinal cases and

In Portsmouth the [illegible] number of cases among civilians (including the dockyard [illegible] up to June 23 was 62. At the Alexandra Hospital, Cosham, which [illegible] a large military area, there were 19 cases of cerebro-spinal fever from January 1 to August 14. The first naval case in the Portsmouth district was a private at the Royal Marine Artillery Barracks, Eastney, on January 15; the first military case was reported on January 19 in the Royal Field Artillery Hilsea, and the first civilian case on February 11 in a boy aged 4½ years close to Lastney Barracks and probably infected from that source (*vide* p. 375). Out of the 36 cases treated at the Royal Naval Hospital, Haslar, the source of infection was traced in 17. Of the 36 cases, 19 proved fatal, a mortality of 52·7 per cent.

In the Portsmouth district the monthly incidence of cases in the Navy was as follows: January 10, February 4, March 11, April 3, May 4, June 3, July 1. This incidence was compared with the following meteorological conditions forwarded by Fleet Surgeon G. T. Bronteh: the direction of the wind; the saturation of the atmosphere with water; and the day and night temperatures from January 1 to April 30. Up to January 15, when the first case occurred, the wind was west and south-west; for the rest of the month it was north and north-east. In February the prevailing winds were west and south. In March the winds were west up till March 6, after this they were mainly east or north. In April the wind was mainly south-west. It therefore appears that north and east winds favour the incidence of cerebro-spinal fever, whereas south and westerly winds do not. The average daily temperature in January was 46° F., in February 42° F., in March 47° 1., and in April 54·4° F. A lower daily temperature with east or north wind, appears to coincide with an increased incidence of cerebro-spinal fever. The saturation of the atmosphere with moisture and the difference between the day and night temperatures did not appear to exert any influence on the incidence of the disease.

The Royal Naval Barracks, Portsmouth.—The first case of cerebro-spinal fever occurred on January 27, and at this time there was little, if any, overcrowding. The only mess in which a certain amount of overcrowding has been unavoidable, namely, that of the chief petty officers, has never had any case of cerebro-spinal fever. In March, 1915, arrangements were made to allow 500 cubic feet space to each man.

Sixteen cases occurred in the barracks in six months (January 27 to July 31), the most in any one month (March) being 4. This sporadic incidence and the evidence as to the source of infection, as far as it goes, justify the conclusion that the disease was in most instances contracted outside. In addition to these 16 cases, two men developed cerebro-spinal fever shortly after being drafted from the barracks. Most of the cases were in young recruits; 13 of the patients were under 20 years of

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had a bad cold at the time it is just possible that he acted as a carrier, and that the infection was contracted in Haslar and not at the Royal Naval Barracks, where the last case occurred on February 24, in a signalman who left the Crystal Palace on February 20. On the other hand, the occurrence of German measles may have either converted the patient supposing he was a carrier into a case of cerebro-spinal fever, or have prolonged the incubation period of cerebro-spinal fever. As there is this doubt about the origin of infection, the cases is not included among those originating in the barracks.

age (with seven deaths) [illegible] 20 and 30 years of age and were all [illegible] all the cases was 18·5 years and of the 10 fatal cas[illegible]

The probable source of [illegible] cases. The first case, on January 27, contracted [illegible] In the second case, on January 30, the source of [illegible] not traced. There were 3 cases in February the third (February 9) was not traced, the fourth (February 9) was in the same [illegible] first case (January 27) and the fifth (February 21) had [illegible] this before from the Crystal Palace, where there had been [illegible] in the first sixteen days of February. There were 4 in March. 1 was not traced. 2 probably contracted the disease in Gosport [illegible] there was a small outbreak at the time and the other was [illegible] the disease from the fifth case. Up to the end of March there were [illegible] of which 7 proved fatal and 1 was invalided whereas after that date there were 7 with 3 deaths and 1 invaliding. In April there was only—a boy, who arrived the day before from the Impregnable III. where [illegible] there had not been any case since February and none [illegible] till May 30, moreover, he came from a mess in which no [illegible] of the disease had appeared. In May, 2 cases occurred in boys [illegible] from the 'Impregnable III' from a mess in which a case occurred on [illegible] May 11, seven and fourteen days previously. One of them was left permanently blind. In June there were 3 cases, on the 10th [illegible] and 28th which could not be traced, and there was another on July 30.

A tabular statement of the monthly [illegible] evidence of influenza, catarrh, tonsilitis and sore throat did not reveal any relationship between their prevalence and that of cerebro spinal fever. This negative evidence may be correlated with the view that there were not many active carriers in the barracks for prevalence of catarrhal affections would tend to favour the carrier state and the outbreak of cerebro spinal fever.

Month	Cases of cerebro-spinal fever	[illegible]
January	2	[illegible]
February	3	[illegible]
March	4	[illegible]
April	1	[illegible]
May	2	[illegible]
June	3	[illegible]

Out of 132 contacts examined bacteriologically only one was positive (Dunbrack).

Royal Marine Artillery Barracks, Eastney.—As the first case in the Portsmouth district occurred in these barracks on January 15 and as it was suggested that the infection was introduced into the barracks by a Canadian team which came to play football against the barracks, on January 9 this question was discussed in a previous report which may now be summarized. It is known that four cases of cerebro spinal fever occurred in the camp at Valcartier, in Canada that there were three cases during the voyage to this country, and many in their camp on Salisbury Plain; but none of this Canadian team is known to have been a carrier or to have had the disease and none of the opposing Eastney team contracted cerebro spinal fever. Swabs from the throats of the Eastney team sent

to Greenwich [illegible] be negative [illegible] Fleet Surgeon P W Bassett Smith C B The Canadian team slept in the parade room with some sergeants, none of whom had cerebro spinal fever and for the most part kept to themselves They went home or elsewhere, shown round Portsmouth by a member of the Lustnay team who was a friend of the private who first contracted the disease and was also in daily contact with two men who went down with it on January 30 It was impossible to trace this line of infection any further If any connexion is to be maintained between the Canadian and the Lustnay epidemics it must be assumed that there were at least two undetected carriers one among the Canadian team, who transferred the infection to a member of the Lustnay team—probably the one who showed them round and was a friend of the private who first manifested the disease On the other hand the almost simultaneous outbreak of cases in other parts of the country and the weakness of the assumption of two hypothetical carriers make it probable that the epidemic was due to some undetected chronic carrier, and that the Canadians cannot be held responsible for the infection

There was no evidence of overcrowding in the barracks, which together with the School of Music has an individual cubic space of 560 ft at this time all the rooms, except one from which cases of cerebro spinal fever came were below their normal complement

Influenza and catarrh were severe in January, the total of such entries for the weeks ending January 16 23 30, during which there were 6 cases of cerebro spinal fever numbered 52 and 56 as compared with 36 and 41 for the whole of February during which there was 1 case only of cerebro spinal fever, and 22 and 41 in March, during which there were 3 cases of cerebro spinal fever These catarrhal conditions, by facilitating infection of the throat by meningococci, and so the existence of carriers might favour an outbreak of the disease

Investigation of the places visited by the men during Christmas leave did not show any evidence that the disease was contracted elsewhere

Of the 12 cases there were 6 in January (2 occurring between January 1 and 20) 1 in February, 3 in March, and 2 in May Of the 6 cases in January 5 died, whereas of the 6 subsequent cases 1 only proved fatal

The infection was traced in 5 out of the 12 cases The second and fourth were infected from the first case the fifth was infected from the third case the tenth was in the sick bay with the ninth case and showed symptoms of cerebro spinal fever three days later the eleventh case probably contracted the disease in Birmingham

Of the 12 cases 7 were under 20 years of age with 3 deaths, 2 between 20 and 29 with 2 deaths 2 between 30 and 39 with no deaths and 1 aged 42 fatal The average age of all the cases was 23 2 years of the fatal cases 21 years and of the recoveries 22 2 years

Forty close contacts were examined and all found to be negative

Royal Marine Light Infantry Barracks, Forton.—Four cases of cerebro spinal fever were reported from this depot but in none of them did the infection originate in the barracks In January two occurred in privates who had quite recently (three and five days) been drafted from Deal, and almost certainly brought the disease with them A quartermaster who worked in the barracks contracted the disease on March 9, he lived in Gosport, and cases of the disease occurred at that time in the immediate

neighbourhood of his house and on March 11 his son was attacked with a rash and a temperature of 105° F. The fourth case was that of a man who, though nominally in the barracks had been lent to the anti-aircraft guard in Woevil's Yard and had not been in the barracks for some months. He slept in a crowded and ill-ventilated room in Woevil's Yard, and four days before the onset of cerebro-spinal fever returned from leave at Farnham Surrey, where there were instances of cerebro-spinal fever among the troops.

It is suggestive that there was very little influenza, catarrh, sore throat or tonsillitis in the barracks. From January 1 to May 1 there were 27 cases of influenza, 63 of catarrh, 36 of tonsillitis and 4 of sore throat. There was no overcrowding in the early part of this year.

Out of 20 contacts 1 was found to be positive (Dudding).

Isolated cases were sent into the Royal Naval Hospital, Haslar from the "Vernon," the "Excellent" and the "Fisgard." In none of these was the source of infection traced. The contacts were all negative.

Royal Naval Barracks, Chatham.

In the spring of 1911, two cases occurred (on March 2 and April 22) among the stokers in the "Pembroke." In August 1914, the enlistment space fell to 210 ft. per man. The first case of cerebro-spinal fever to occur during the War was a stoker in the "Pembroke" on October 29, and the third on January 15 was in the same ship: the occurrence of cases in the "Pembroke" raises the possibility of a chronic carrier in that vessel, though the intervals are long. The second case arose on January 10 and the source of infection was not traced. The fourth case occurred on January 27 and was followed by 14 cases (9 in February) at short intervals up to March 17 so as to suggest infection from within the establishment and more than half of these cases were traced to carriers or to infection from previous cases. After this date 3 isolated cases occurred: 1 in the "Pembroke" was not traced: the other 2 probably contracted the disease outside: making 21 in all, with an average age of 26 years. Eleven of the 21 cases were in recruits: many of whom had recently joined: their average age was 21 years and their duration of service twenty four days (7 having less than twenty days' service and 1 as long as eighty eight days). Five had been recently vaccinated, 2 had shortly before the onset received a blow on the head: and 2 others had recently had scarlet fever—factors which, by reducing resistance, would favour infection. Between February 1 and March 17 there were 5 cases among the engine room artificers. One hundred and thirty of these men were then examined: 30 were found to have nasal or buccal catarrh and from among these 3 carriers were isolated. The mess was then divided into two so as to give more air space and after this there were no more cases among the engine room artificers.

Ninety two contacts were sent to the Royal Naval Hospital, Chatham, and 12 carriers were isolated. One of the carriers developed the disease while isolated and died. Of the 21 cases, 9 were definitely traced to healthy carriers by Deputy Surgeon General C. J. Mansfield, M.V.O. All these 21 cases were transferred to the Royal Naval Hospital, Chatham, and 16 died, or 76 per cent. As the mortality rises with each decade up to 50 it might be assumed that this high mortality was due

to the fact that 10 of the patients were over 30 years of age But this was not so in this instance, for of the 11 patients under 30 years of age 8 died, as against 8 deaths among the 10 patients over that age In addition, 3 cases from other sources (Shorley I, the 'Barrier' I H M Dockyard 1) were treated at the Royal Naval Hospital Chatham

CASES OF INFLUENZA CATARRH SORE THROAT AND TONSILITIS FROM JANUARY 1 TO JUNE 30 1915 AT THE ROYAL NAVAL BARRACKS CHATHAM

Disease	January	February	March	April	May	June
Influenza	100	101	74	36	10	13
Catarrh	154	204	111	101	72	37
Sore throat	50	40	29	19	16	11
Tonsilitis	49	78	136	88	63	64
	353	413	350	306	201	125

The maximum incidence of cases of cerebro-spinal fever (9) and of catarrhal affections of the throat (413) occurred in February, and the large number of catarrhal affections (393) in January might be thought to have favoured the carrier state and so to have been instrumental in leading to the comparatively large number of cases of cerebro spinal fever in the following month The incidence of cerebro spinal fever (5) and of catarrhal affections (350) in March corresponded with the observation that three cases of the former appeared to be due to infection in the barracks (two by the same carrier) In April, although the number of catarrhal cases was not much less (306), the activity of meningococcic infection in the barracks had ceased the only case of cerebro spinal fever having contracted this disease in West Ham

The direction of the wind and the day and night temperatures from January 1 to April 30 were examined in relation to the incidence of cerebro spinal fever In January the wind was mainly west or south west for the first half of the month, and north and north east in the second half of the month two cases occurred in the first half and one in the second half The average daily temperature was 10 5° F February, during which there were 3 cases was cold (average temperature 38 1° F) although the wind was almost always south west In March there were 5 cases, all before March 17 and up to this date the wind was more often west or south west than north or east In the second half of the month there was rather more north and east wind than in the first half The average temperature for the first seventeen days and for the last fourteen days was in each case 42° F In April there was one case of cerebro spinal fever (on April 5) The direction of the wind was on the same lines as in January, but the average daily temperature was 49° F

So far, therefore, the occurrence of cerebro spinal fever would appear to be associated much more with west and south west winds than with east and north east winds, but examination of the direction of the wind on the three days preceding the occurrence of cases during January to April shows that in about half the cases south and west winds and in the rest east and north winds, prevailed No decided conclusion, therefore, is justified as to the influence of the direction of the wind on the incidence of the disease The largest number of cases occurred in February, which had the lowest average daily temperature, namely 38° F

Plymouth District.

In the summer of 1914 there were 7 cases in the 'Impregnable' and 2 in the 'Powerful'. Sporadic cases began to arise among the civilian population in January, the first naval case having occurred on December 22, when on leave.

Thirty cases are considered here. 27 were treated in the Royal Naval Hospital, Plymouth, and the remaining 3 were seen when on leave. A man from the 'Ajax' was also treated in the Royal Naval Hospital, but is not included here. Of the 30 cases, 10 arose in the Royal Naval Barracks, 9 in the 'Impregnable', 3 in the Royal Marine Light Infantry Barracks, 2 in the 'Powerful', and 1 in the 'Indus'. One boy borne in the 'Indus' was in the Royal Naval Hospital, and is therefore included under that heading. A boy who left the 'Impregnable' on April 3, where there had not been cases since February 12, developed cerebro-spinal fever the next day at Portsmouth (see Portsmouth District, p. 385).

Two cases occurred in December, 1914 (on December 22 and 26), none in January, 17 in February, of which 8 were in the 'Impregnable', 3 in March, 6 in April, and 2 in the last two days of May. There was an interval of five weeks between the cases in April and those in May. There was a corresponding freedom from the disease among the military and civil population until the end of May, when there was a recrudescence.

Up to March 1 there were 19 cases with a mortality of 9 or 47·3 per cent., whereas among the 11 subsequent cases there were 2 deaths only. The total mortality of 11 out of 30 cases, or 36·7 per cent., is very low. This is probably related to the fact that 25 of the patients were under 20 years of age, and that none was over 30, for though the disease specially attacks the young the mortality increases with age (*vide* p. 380). The average age of the 30 cases was 18 years (of 12 recoveries 17·7, and of fatalities 18·3 years). Out of the 30 cases the source of infection was traced in 11.

Overcrowding occurred at the Royal Naval Barracks, in the 'Impregnable', and in the 'Powerful'.

In December, 1914, in which cases occurred on the 22nd and 25th, the wind was south-west for the first nine days, then easterly until the 14th, and northerly on the 22nd, 23rd, 24th. Although not convincing, the occurrence of east and northerly winds before the onset of the disease is suggestive. In January, in which there were no cases, the wind was easterly or north-east from the 21st to the 29th, and thus preceded the outbreak of 17 cases of cerebro-spinal fever in February, during which the wind was mainly south-west. In March there were 3 cases only and there was a good deal of east and north wind, especially from the 22nd to the 29th. On April 5 a man who had been in close contact with a case, and had had catarrh for some days, showed meningeal symptoms, possibly the cold winds at the end of March may have been instrumental in his illness. For the first seven days of April the wind was south-west, and for the remainder of the month mainly northerly. Cases of the disease occurred on the 14th, 21st and 26th. There was therefore some evidence that the disease is prone to follow in the wake of east and north winds.

The comparison of the average daily temperature with the monthly

incidence of cerebro spinal fever did not show any striking correspondence between a low temperature and the incidence of the disease

Month		Average daily temperature	Cases of cerebro-spinal fever
1914	December	44 4° F	2
1915	January	45 0°	0
	February	42 8°	17
	March	47 3°	3
	April	48 5°	6

Fleet Surgeon H C Whiteside found that out of 402 close contacts 97, or 27 per cent, were carriers Two of these carriers developed the disease Remote contacts were also examined out of 389 from the Royal Naval Barracks (where there were 15 cases) 45 or 11 6 per cent were carriers out of 667 from the Youths Training Establishments 29 or 4 35 per cent, were carriers Of the 1 458 contacts close and remote, 171 or 12 per cent carriers were found ' Close contacts were persons who had slept in close proximity to a patient or were in the same mess or otherwise brought into close relationship with him Remote contacts were all those who slept in the same room or were in the same training class as a patient

The Royal Naval Barracks, Devonport contain five blocks (A B C, D, E) A block contains three rooms with a normal cubic capacity per man for messing accommodation of 293 cubic feet and for sleeping accommodation 354 cubic feet B block contains four rooms with corresponding cubic spaces of 302 and 365 cubic feet C D, and E blocks each contain four rooms with corresponding cubic spaces of 216 and 274 cubic feet It is noteworthy that of the 15 cases there were 12 in blocks D and E and only one in B block This is compatible with the view that deficient cubic space favours the spread of the disease Further in February when there was overcrowding in the barracks the largest number of cases (6) in any one month occurred Out of the 15 cases 1 had been in the Service over a year, the other 14 were recent recruits with an average service of thirty days

The figures given below show that the incidence of catarrhal affections (influenza catarrh, sore throat and tonsilitis) in the barracks was highest in January and February, and that though the maximal incidences of the catarrhal affections and of cerebro spinal fever both occurred in February the correspondence in other months was far from exact It might be thought that the high incidence of catarrhal affections in January during which month there were no cases of cerebro spinal fever, was instrumental by favouring the carrier state in the occurrence of 6 cases beginning on February 12

Month	Cases of catarrhal affections	Cases of cerebro spinal fever
1914—December	135	2
1915—January	395	0
February	364	17
March	210	3
April	134	6
May	160	1
June	97	0

Fleet-Surgeon H C Whiteside dealt with the bacteriological examination and treatment of contacts at the Royal Naval Hospital, Plymouth in the JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE, 1915 vol i No 3 pp 248 264.

Two cases occurred in December in men who were in the same room and came from Ashburton. The first, who had not been home for some time, was taken ill in the barracks on December 22 and infected the second, who went sick when on Christmas leave on December 25. In January there were no cases. The next case was on February 12 and was followed by cases on the 14th, 18th, 23rd (two cases) and 26th, and on March 4. Then, after an interval of seventeen days a man who had come to Plymouth the day before was taken ill on March 31, and obviously brought the infection with him; he travelled down with a man who after attending the sick quarters for some days manifested meningeal symptoms on April 5. In the meanwhile an untraced case occurred on March 31. Cases cropped up on April 11, 21 and 26. Then there was an interval of thirty-three days until the last case occurred on May 29. It is noteworthy that both in the civil and military population of the district there was a corresponding freedom from the disease with a recrudescence at the end of May.

Fleet Surgeon H. C. Whiteside examined 78 close contacts and found 15 or 19·2 per cent. positive, and 389 remote contacts with 45 or 11·6 per cent. positive—a high percentage.

The Impregnable establishment consists of three ships and has no official complement. The number of boys varies greatly with recruiting. The following estimate of the cubic space is provided by Fleet Surgeon F. Tedorb. 'Impregnable I' has a cubic space in the sleeping compartments varying from 175 to 291 and averaging 244 cubic feet per boy. 'Impregnable II' has a cubic space in the sleeping compartments varying from 167 to 308, and averaging 209 cubic feet per boy. 'Impregnable III' has a cubic space in the sleeping compartments varying from 210 to 497 and averaging 313 cubic feet per boy. There is therefore very definite overcrowding in all three ships. I inspected the ships by day on July 9, and the boys class room in 'Impregnable II,' which has, I understand, been already condemned, was obviously stuffy. I also went over the 'Impregnable' that night at 10 p.m. with the expectation of finding the air in the sleeping compartments offensive. It was a quiet fine night and the ports were open. The only place in which the air seemed offensive was the boys class room, which is used as a sleeping compartment for twenty-eight boys with a cubic space of 183 ft. per boy, but on that night held twenty boys with a cubic space of 256 ft. per boy.

In the summer of 1914 there were 5 cases of cerebro-spinal fever in the "Impregnable." Between February 8 and 12, 1915 5 cases of the disease occurred, 4 being from "Impregnable III, though from different messes and one from 'Impregnable II.' On February 13 and 14, contacts to the number of 123 were removed to the Royal Naval Hospital, Devonport and 31 carriers were detected. The carriers were detained and 2 of them developed cerebro-spinal fever on February 15 and 24. On February 19 a boy from 'Impregnable III' went on leave to Torquay and developed the disease. The outbreak then stopped and it may be concluded that the isolation of the contacts played a part in this, especially as two of them subsequently went down with the disease while in hospital. On April 3 a boy was drafted from 'Impregnable III,' where he was in a mess which had not contributed any case of cerebro-spinal fever, to the Boys' Training Establishment, Royal Naval

Barracks, Portsmouth, the disease appeared [illegible] next day. On April 24 two boys [illegible] cases of cerebro spinal fever occurred on February 11 were transferred from 'Impregnable III' to the Royal Naval Barracks, Portsmouth. They developed the disease on May 1 and 8 respectively. The last case occurred on May 30 in 'Impregnable I' where no cases of cerebro spinal fever had previously arisen. He joined the 'Powerful' on March 23 was transferred on April 5 (the same day as the boy referred to above) to the Royal Naval Barracks, Portsmouth, where he was in the same room and in an adjacent mess to the two boys drafted there on April 24 from 'Impregnable III'. He was discharged to the 'Impregnable' on May 21.

February during which the outbreak of 8 cases of cerebro spinal fever occurred had the highest incidence of catarrhal affections (catarrh sore throat, tonsilitis and influenza).

Month		Cases of [illegible]	Cases of cerebro spinal fever
1914	December	37	0
1915	January	79	0
	February	68	8
	March	12	0
	April	73	1*
	May	47	3†
	June	60	0

* This boy was drafted from the 'Impregnable' on April 13 and developed cerebro spinal fever next day at Portsmouth.

† Two of the boys drafted seven and fourteen days previously from the 'Impregnable' developed the disease at Portsmouth. The other boy was drafted to the "Impregnable" from Portsmouth eight days before he went sick.

The "Powerful" establishment consists of two ships— Powerful I and II. The boys are distributed in these two ships according to their work. 'Powerful II' is stated not to be overcrowded but 'Powerful I' is certainly overcrowded on April 10 when the two cases of cerebro spinal fever occurred, there was a cubic space of only 235 ft. in the sleeping compartments. The hammocks are within 10 in. of each other, and the casements, in which classes of about twenty boys are held have a cubic space of from 1,690 to 1,705 ft. or 85 cubic feet per boy. Catarrhal affections are common, as is seen by the following table for the first six months of 1915, furnished by Fleet Surgeon Oswald Rees —

Month	Catarrh	Sore throat	Tonsilitis	Total cases	Total of days sickness
January	31	42	18	91	377
February	17	61	45	123	697
March	41	[illegible]	58	136	677
April	13	30	13	56	370
May	16	11	10	37	130
June	15	16	36	19	120
	169	209	176	554	2,821

Practically all the cases of sore throat and tonsilitis have been isolated in casements and this would tend to prevent their spread. This isolation has not been adopted with the cases of catarrh.

In 1914 two cases of cerebro spinal fever occurred in the "Powerful". In 1915 two cases occurred on April 10 in the same mess in "Power

Inl I Fifty five [illegible] or 27 per cent, detected [illegible] had had influenza in [illegible] previously, and was probably the [illegible] occurred With condition [illegible] of the disease is striking and remarkable

Royal Marine [illegible] — Three cases occurred in these [illegible] The [illegible] were not friends, and the [illegible] two of them belonged to the same [illegible] [illegible] or not in rooms that open [illegible] Fleet Surgeon J Andrews, R N could not discover any [illegible] between the men or that they had visited infected houses but [illegible] pointed to the view that the infection might have been acquired [illegible] picture halls which they visited There were however, comparatively few cases of cerebro spinal fever in the civilian population Dr O Hill the Medical Officer of Health for Plymouth informs me that [illegible] the first six months of this year, seventeen civilian cases of cerebro spinal fever were notified Adequate precautions were taken at the barracks and no more cases occurred

Indus —Two cases occurred in boy artificers on the 'Indus but one of them had been billeted in the Royal Naval Barracks until two or three days before the onset of the disease on February 23 and should therefore be considered as belonging to the Royal Naval Barracks The other case had been billeted in the Royal Naval Barracks until three weeks before the onset on March 4 Of 18 contacts from the 'Indus, 3, or 16 6 per cent were found to be carriers

Crystal Palace

At the Crystal Palace there were between January 16 and the end of July 33 cases of cerebro spinal fever, with a mortality of 21 or 63 6 per cent Up to March 1 there were 17 cases, of which 14, or 82 per cent were fatal after March 1 there were 16 cases of which 6, or 37 5 per cent were fatal A falling mortality in the course of epidemics is generally recognized but it should be pointed out that the cleanliness and ventilation of the men's quarters were much improved in the later part of the outbreak The cases were mainly among young recruits the average age of all the cases was 23 years 16 were under 20 years of age and 27 under the age of 25 Of 16 under 20 years of age, 8 proved fatal of the 27 under 25 there were 16 deaths while of 6 cases over the age of 25 years, 5 died While therefore, the majority of the cases were young patients the mortality ratio increased steadily with the age

The first case occurred on January 16 in a boy who returned from Christmas leave (December 30 to January 6) he had been to Aberdeen, where there had been a case of cerebro spinal fever in a Canadian, fatal on December 5, but none since he may also have visited Glasgow, where cases had occurred The second case on January 30 was not traced, then after an interval 3 occurred on January 29 and 1 on February 1, 2, and 3 Fifteen contacts from these cases gave uniformly negative results After an interval of four days the ninth case occurred in the Officers Training Corps on February 7 Two days later a man who

slept in the same [illegible] Case 7 developed the disease and 1 of his 4 contacts was [illegible] carrier Between February 10 and 14 3 occurred in the [illegible] Battalion and among the contacts of 1 case that had had [illegible] e January 28 3 carriers were found Some weeks late[illegible] this battalion were found to be negative bacteriologically [illegible] among the Officers Training Corps on February 14 and March 1 all contacts being negative Isolated cases occurred on February 23 and March 1 Then on March 14 to 16 3 arose in B Company 1st Battalion, the contacts of 1 case giving 3 carriers one of whom was positive for three weeks Isolated cases occurred on March 15 and 16 and then there was a lull till March 23 when a sporadic case appeared On March 27 there were 2 cases in the same company Five occurred in the first thirteen days of April, and then there was none until July 8, when a man who had been in contact with Case 26 who had returned to duty went sick A fresh bacteriological examination of faucial swabs from Case 26 proved negative

Altogether the infection was traced in 8 cases out of the 33, or 24 per cent The close proximity of the Crystal Palace to London no doubt favoured the introduction of the disease from outside infection

The contacts 122 in number were examined by Fleet Surgeon P W Bassett Smith, C B , who found 12, or 9 9 per cent positive

Deal

The barracks consist of three groups of buildings some distance apart and with separate blocks in each An increase in the number of men was naturally accompanied by an increase in the sick lists thus in the January to March quarter of 1914 there were 115 cases of catarrh as compared with 232 in the corresponding quarter in 1915 but while the number of men was about doubled the cases of catarrh were nearly trebled Overcrowding therefore increased the incidence of catarrh, which would favour the spread of meningococcic infection For some years at least there had not been any case of cerebro spinal fever in the barracks

The origin of the outbreak was not discovered There were no civilian cases in Deal or Walmer, but there were some at Sandwich eight miles off A man who went sick on February 1 had spent his Christmas leave (December 23 to 28) at Salisbury (town) where, the Medical Officer of Health (Dr Fison) informs me the first case of cerebro spinal fever occurred on December 13 in a nurse (engaged to a Canadian officer) in the hospital, the second on December 20 and the third on December 23 Analysis of the rooms squads and companies of the cases showed a wide distribution of the disease, and did not explain how the infection spread, but as the canteen, the recreation and billiard rooms are common ground, contact may have occurred there

The outbreak in the barracks of what was subsequently (February 5) determined to be cerebro spinal fever really began on January 20 and fresh cases followed almost daily until February 13, when there was an interval of twelve days 2 cases then occurred on February 25 and 27 and then after another interval 3 cases on March 10 12, 14 After this there were no more cases The cessation of the epidemic may possibly have been connected with the fact that all the men using the warm swimming bath sprayed their throats before bathing

The Deal Marine Depot was apparently responsible for 25 cases, 17 were treated in the infirmary and 3 developed at Maidstone among the 1,000 men who marched there from Deal. The 20 cases are considered here. In addition 2 occurred at the Royal Marine Light Infantry Barracks, Gosport, on January 19 and 24 within a few days (five and three respectively) of leaving Deal (*vide* Report on Portsmouth district) and 3 occurred among the Deal Battalion shortly after their arrival at Blandford (*vide* Report on Blandford).

Of the 20 cases 5 proved fatal. Out of 17 before March 1, there were 5 deaths, whereas the 3 cases after that date recovered. This percentage of deaths (80) is the lowest in any of the groups of cases though that of 36·7 per cent. in the Plymouth district approximates to it. All the patients were under 20 years of age the average age being 17·6 years. (for 14 recoveries 17·8 years and for 6 fatalities 17·3 years). The remarkably low death-rate at Deal is probably due to the fact that all the cases were under 20, for, as shown elsewhere, the mortality is less under 20 years of age than at any other period of life, thus the mortality (45) of all the cases in the Navy (103) under 20 years of age was 43·7 per cent., as compared with 62·8, 76, 77, and 66 per cent. for four succeeding decades.

The disease did not spread to non-commissioned officers or to the children of married men living in barracks but the schoolroom for these children was no longer used at other times by the men.

One hundred and thirty-two contacts were examined: of these, 97 were close contacts with 16 positive results and 35 remote contacts all negative. The percentage of positive results among the 132 contacts was 12·1 (E. A. Shaw).

During the first fifteen days of January the wind was with one exception west or south-west. On January 16 and 17 north-west winds preceded the outbreak of the epidemic: from January 19 to 21 the wind was west and for the rest of the month nearly east or north-west. During February in which 10 cases of cerebro-spinal fever occurred the wind was south or south-west on twenty days and north-west on the remaining eight days. But 8 of the cases occurred in the first thirteen days that is, after the north-west winds at the end of January; the other 2 cases occurred directly after the north-west winds on February 23 to 25. In March, north-east and north-west winds on the 7th, 8th and 9th preceded the appearance of the last 3 cases of the disease on March 10, 12, 14. The occurrence of north and east winds was thus followed by the incidence of cerebro-spinal fever cases.

The following shows a comparison between the average daily temperature and the monthly incidence of cases of cerebro-spinal fever:—

	Average daily temperature	Cases of cerebro-spinal fever
January	44·4	7
February	46°	10
March	45°	3

Blandford

The camp was opened in January 1915, and the first case of cerebro-spinal fever occurred on February 1 in the Deal Battalion. On February 3 two cases occurred, one in the Deal Battalion and the other in the

Collingwood Battalion which was in the Blandford Camp On February 4 another man in the Deal Battalion went sick After an interval of a fortnight a man in the Howe Battalion manifested the disease The sixth and last case—a sporadic one—occurred on April 9 in the Benbow Battalion

At the Marine Depot at Deal an outbreak of cerebro spinal fever really began on January 20 though its nature was not absolutely settled until February 6 In the meanwhile 1,000 men marched on January 24 from Deal *en route* for the Blandford Camp, they stopped the first night at Littlebourne the second at Charing the third at Bearsted, and the following morning (January 27) entrained from Maidstone where three men went down with the disease On its arrival in Dorset the battalion was isolated for three weeks at Damerham and Stoorpaine some miles from the main camp at Blandford the men were billeted in cottages and two of them developed cerebro spinal fever in one instance the infection spread from one of these men to a girl in the same cottage Four other civilian cases occurred

Of the six cases four died Four cases were under 20, one was 24, and one aged 34 The average age of all the cases was 32 years, of the fatal cases 22·7 years, and of the two recoveries 21 years The cases were transferred for treatment to the Royal Naval Hospital, Portland, where 58 contacts were examined 4 were positive on the first examination, and negative afterwards One sick berth attendant was positive on two occasions (Shand and Hitch)

Meteorological records were not kept at Blandford January and February were both very wet

Shotley Barracks

There are fifty-two dormitories each with a cubic space to each boy of 476·6 ft Some of these dormitories are usually empty in preparation for drafts which are constantly arriving During the War, each dormitory has had an individual cubic space of 400 ft The beds are now arranged with the head and foot alternately In one dormitory (No 17) there have been as many as sixty seven occupants, with a cubic space of 356 ft, but no case of cerebro spinal fever occurred in it The boys do not live or eat during the day in these dormitories The gymnasium dormitory, which contains 105 boys who live, eat, and sleep in it is used for isolating drafts from barracks, usually for ten days The class rooms, which take classes of about twenty five each, appeared to be well ventilated with, in most instances, a cross draught There does not, therefore, seem to be any reason to consider that overcrowding has been responsible for the cases

The seven cases of cerebro spinal fever occurred in newly joined boys on an average, twenty five days after entering the service the shortest period (two cases) was seventeen days and the longest forty two days after joining A case of cerebro-spinal fever in a man aged 28 was treated in the hospital, but is not included here, he came from the Queen Victoria and had not been ashore for one month

The first case occurred on January 23 and was transferred to the Royal Naval Hospital Chatham, proving fatal on March 20 After an interval of five weeks three cases appeared between February 28 and

March 4 two of these cases (onset February 28, March 4) joined the same day (February 13) from different parts of the country and slept for one night only in the same dormitory In the home of the other boy (onset March 1), who joined the barracks on February 8 some soldiers had been billeted The other three cases occurred on April 26 May 29, and June 10 Analysis of the dormitories and classes of the seven cases did not reveal any evidence of the spread of infection Three of the cases had been recently vaccinated, the interval between vaccination and the onset of cerebro spinal fever being twelve, seventeen, and seventeen days respectively

In the Felixstowe district there were thirty cases of cerebro spinal fever between January 21 and July 6 and eighteen before February 28, and no cases between April 23 and June 27 It is therefore improbable that the last two cases at Shotley (on May 29, June 10) were imported from the Felixstowe district There was one case of the disease in 1914, on October 28 in a child aged 1 year 10 months. The incidence at Shotley of catarrh and tonsilitis during the first half of 1915 was much higher than in the corresponding period of 1914 Thus from January to March 1915 there were 203 cases of catarrh and 53 of tonsilitis as compared with 30 of catarrh and 47 of tonsilitis in January to March, 1914 From April to June 1915 there were 99 cases of catarrh and 129 of tonsilitis as compared with 52 and 69 in the April to June quarter of 1914. In the last quarter of 1914 (no cases of cerebro spinal fever) there were 18 cases of catarrh and 56 of tonsilitis as compared with 203 and 53 in the first quarter of 1915 (4 cases of cerebro spinal fever) A high incidence of catarrh therefore coincides with the occurrence of cerebro spinal fever From the monthly return of catarrh and tonsilitis it is seen that the high incidence of catarrh (85) in February preceded the small outbreak of three cases of cerebro spinal fever, February 28 to March 4

1915	Catarrh	Tonsilitis
January	58	10
February	85	7
March	60	16
April	62	37
May	25	52
June	12	80

Contacts were examined by Staff Surgeon Dudley at the Royal Naval Hospital Chatham and some were examined by Dr Sheffield Neave, who was doing bacteriological work at Ipswich the latter arrangement obviated the risk that the swabs might fail to reveal the meningococcus because of the delay in conveying them to Chatham One positive contact only was found

Cases in Sea going Ships

Twelve cases occurred in sea going ships and in one vessel (the "Biarritz") only was there more than one case a most satisfactory result The cases occurred in the Chanzumole (January 20) 'King George V February 19) the 'Implacable (February 23) the "Ajax (March 11), the "Queen Victoria (April 1), the Norma (April 22), the 'Bellerophon (April 23) the 'New Zealand (April 29), the 'St Vincent

(May 9) the "Biarritz" (May 19), the "Liverpool" (May 25) and the "Biarritz" (July 19) The probable source of infection was traced in 3 cases The average age of the 12 cases was 26 years of the 8 fatal cases 28 5 years, and of the 4 recoveries 21 5 years

NAVAL SICK QUARTERS, WICKLOW

One fatal case of cerebro-spinal fever occurred in a chief petty officer who contracted the disease from a carrier from Cork

"AKBAR" ESTABLISHMENT

The 'Akbar' establishment consists of three hulks moored side by side The men on board are civilians engaged in engineering work In two hulks the ventilation is deficient but especially in one, the lower deck of which only provides an individual cubic space of 220 ft for mess ing and sleeping In the other hulk the arrangements appear to be adequate Four cases of cerebro spinal fever occurred in the 'Akbar' establishment on March 26 April 11 April 23, and June 9 They were all treated at the Dingwall Hospital and recovered

For the most willing and courteous help in this investigation, I offer my sincere thanks to the medical officers of the hospitals, barracks and establishments which it has been my privilege to visit in addition to those incidentally mentioned above I must refer to the following Deputy Surgeons General H W G Doyne, V G Thorpe Fleet Surgeons M Rodd, J A Campbell C L W Bucton W J Colborne, J C Ferguson, C Strickland T W Parker R Hickson R Hill C V O, W H S Stalkartt Staff Surgeon B Pick Surgeons C H Gimlette J G Bagge, J A Farrer and to Dr J J Jervis (Croydon Borough Hospital) Dr F Ford Cager (S W Fever Hospital) Dr Mearns Fraser (M O H Portsmouth) Dr Linton (M O H, Tunbridge Wells), Dr A K Chalmers (M O H, Glasgow), Professor M Hay (M O H, Aberdeen) Dr J Robertson (M O H Birmingham), Dr Dunlop (M O H Torquay), Dr G I P Stewart (M O H East Suffolk) Dr Conford (M O H, Felixstowe), Colonel Caldwell and Lieut M Culpin, R A M C (Alexandra Hospital, Cosham)

(III) SUMMARY OF THE RARER MANIFESTATIONS AND COMPLICATIONS

More or less complete notes of 163 out of the 170 cases were obtained and abstracted But as comparatively little interest would attach to an analysis of all the constant or common symptoms, such as fever, headache, rigidity of the neck, retraction of the head, Kernig's sign, delirium, and vomiting, the rarer symptoms and complications will be briefly mentioned here But before summarizing the rarer symptoms it may perhaps be permissible to refer to the rashes, which are rare in sporadic cases, at least as far as

[illegible] were stricken [illegible] Rashes were noted in [illegible] cases of [illegible] In a few of these 102 cases the rash was purpuric [illegible] it was petechial or purpuric [illegible] fifty-two cases [illegible] recovered. The rashes with [illegible] hæmorrhages were usually fatal. The rash came out early in the [illegible] stage [illegible] coincide with the rose spots of enteric and was usually present when the patient was first seen. In some instances a hæmorrhagic rash recurred before death. Herpes was noted in 31 cases in 18 of these there was also a rash in 5 the rash and the herpes occurred together. In 13 the herpes followed the rash usually after an interval of four days. In a few instances the herpes extended to the ears or was very extensive. Serum rashes were mentioned in the notes of 19 cases but very likely were commoner than this, and in a few instances were accompanied by pains in the joints.

Strabismus was recorded in 21 cases; it was often transient or intermittent, but one man was invalided out of the Service for persistent diplopia. Of the 21 cases 13 proved fatal.

Photophobia was noted in 21 cases and conjunctivitis in 9, in 1 of which double hypopyon and blindness resulted. Optic neuritis was reported in 4 only but the number of cases examined was not large. Nystagmus was observed in 5 cases, and ptosis in 7 (6 fatal). Definite paralysis was noted in 16 cases hemiplegia being the most frequent (in 8 cases), then facial paralysis without hemiplegia (in 5 cases) bulbar paralysis palatal and pharyngeal paralysis were noted in 1 case each but the last two paralyses may easily have escaped observation in many cases. An extensor plantar response was noted in 11 cases, and was sometimes double, sometimes unilateral. Ankle clonus, opisthotonos and general rigidity were recorded in a few cases. Deafness was prominent in 11 cases (2 due to otitis). Pericarditis with friction and effusion was noted in one case that recovered and pericarditis was found in 3 other cases after death. Synovitis occurred in 8 cases, 6 of which recovered in 2 of these cases the meningeal symptoms were absent or very slight and it has been stated that the prognosis is good in cases with articular manifestations because the joints receive the meningococci and so divert them from the meninges. The synovitis was usually multiple and transient and never suppurated. In addition 1 case had a synovial effusion after serum. Otitis was observed in 4 cases, 1 of which was associated with suppurative parotitis. In 2 cases (1 fatal) epididymitis occurred. Hæmaturia was noted in 1 case and melæna in another. In

2 cases clinically presenting the features of pneumonia, meningococci were found in the cerebro-spinal fluid at the necropsy, which also showed pneumonia. In another case of pneumonia, also at Deal and fatal, meningococci were found in the cerebro-spinal fluid obtained by lumbar puncture. These cases are important as showing that meningococcic infection may co-exist with pneumonia, for pneumonia may produce meningismus with a clear and sterile cerebro-spinal fluid. In one case of cerebro-spinal fever at Chatham, aspiration pneumonia was found at the necropsy. In one case pleurisy without pneumonia was observed clinically (no necropsy), and in another case severe broncho-pneumonia with a patch of pleurisy was found after death.

(IV) SUMMARY OF THE RESULTS OF TREATMENT

This summary is abstracted from the notes of 168 cases, 89, or 54·6 per cent., of which proved fatal. The prolonged and unsatisfactory cases naturally received more varied treatment than the fulminating cases, some of which died shortly after coming into hospital. As will be seen by the tabular statement, various forms and combinations of treatment were employed, and the most noticeable point is the failure of the generally approved intrathecal injection of anti-meningococcic serum.

Anti-meningococcic serum from various sources (Burroughs Wellcome and Co., the Lister Institute, Mulford (Flexner)), was employed[1]. In 105 cases the treatment consisted of lumbar puncture and intrathecal injection of the serum either alone (62 cases) or with the addition of vaccines, somnin, or hexamine (43 cases). Of these 105 cases 64 or 61 per cent., died, and 41, or 39 per cent., recovered. Of the 62 cases treated by lumbar puncture and intrathecal injection of serum death occurred in 43, or 69·4 per cent., and recovery in 19, or 30·6 per cent., whereas of 43 cases treated in addition by vaccines, somnin, or hexamine 20, or 46·5 per cent., were fatal, and 23 or 53·5 per cent., recovered. It is therefore obvious that the cases treated by the intrathecal injection of serum and especially those in which this was the only specific treatment adopted had a higher death-rate than that (54·6 per cent.) of the whole series of 163 cases. Flexner[2] has laid much

[1] In one case at Deal 10 c.c. of blood serum from a patient convalescent from the disease was injected intrathecally the day before death.

[2] Flexner, *Journ. Exper. Med.*, N.Y., 1913, vol. xvii. p. 553.

stress on the importance of injecting anti meningococcic serum intrathecally as early as possible in the disease and in a table dealing with 1 311 cases he shows that when the serum is injected

	Cases	Deaths	Per cent	Recoveries	Per cent
Anti-meningococcic serum—					
Intrathecally	105	64 or	61	41 or	39
Alone	62	43	69 4	19	30 6
Combined with vaccines somnia hexamine or serum hypodermically	13	20	46 5	23	53 5
Combined with somnia	18	11	61	7	39
Combined with an auto vaccine	11	2	18 2	9	81 8
Combined with hexamine	7	5	71 4	2	28 6
Combined with serum hypodermically	7	3	38 6	5	71 4
Hypodermically	19	6	31 6	13	68 4
Alone	4	1		3	
Combined with intrathecal injection of serum	7	3		5	
Combined with auto vaccine and intrathecal injection of serum	4	1		3	
Combined with an auto vaccine	3	2		1	
Combined with somnia	1	0		1	
Autogenous vaccine (never alone)	16	4	25	12	75
Combined with serum intrathecally	5	1		4	
Combined with serum intrathecally and hypodermically	4	1		3	
Combined with serum intrathecally and somnia	1	0		1	
Combined with serum hypodermically	4	2		2	
Combined with somnia	1	0		1	
Somnia	43	19	44	24	56
Alone	21	7	33 3	14	66 7
Combined with serum intrathecally	18	11	61	7	39
Combined with serum intrathecally and hexamine	1	1		0	
Combined with serum intrathecally and vaccine	1	1		0	
Combined with serum hypodermically	1	0		1	
Combined with an auto vaccine	1	0		1	
Lumbar puncture (alone)	13	1	10 8	9	69 2
Symptomatic treatment (only)	14	10	71 5	4	28 6

within the first three days the mortality rate is 18 per cent, when between the fourth and seventh days 27 2 per cent and when later than the seventh day 36 5 per cent The following tabulation

of 105 cases treated in the Royal Navy has been made on the same lines for comparison —

	Cases	Deaths	Recoveries
1st to 3rd day	70	12 or 50 per cent	28 or 40 per cent
4th to 7th day	24	14 „ 58·3 „	10 41·7 „
Later than 7th day	11	8 „ 72·7 „	3 27·3 „

The failure of anti-meningococcic serum to reduce the mortality was therefore not due to its being given too late for in 66·7 per cent of the 105 cases it was administered within the first three days of the disease. The serum treatment, which was so successful in America (Flexner, Sophian), Belfast (Robb), and elsewhere, was given a thorough trial and proved most disappointing. In very few instances was there the critical improvement which is said to occur in about 40 per cent of the cases that recover (Flexner[1]). Possibly the meningococci were 'fast' to the action of the serum or were para-meningococci. In consequence of its apparent inertness intrathecal injection of serum was in the latter part of the epidemic largely replaced by or combined with other methods, such as the intramuscular injection of soamin. It is true that the mortality naturally diminishes towards the end of epidemics, and this may to some extent explain why, as shown by the tabular statement, the results of intrathecal injection of serum compare badly with those of almost all the other methods and combinations of methods. There is, for example, a remarkable contrast between the effects of intramuscular injections of soamin (*a*) when given alone to 21 cases with a mortality of 33·3 per cent., and (*b*) when combined with intrathecal injection of serum in 18 cases, with a mortality of 61 per cent. It must be recognized that when dealing with small numbers fallacies easily creep in, but merely from these figures the addition of intrathecal injection of serum would appear to have coincided with an increase of mortality in the cases treated with soamin. The high mortality can hardly be explained by the suggestion that it was due to the bad effects of lumbar puncture, for in 13 cases in which lumbar puncture alone was employed there were 9 or 69 per cent., recoveries; and in 91 per cent of the 161 cases lumbar puncture was performed, and in many cases repeatedly, to relieve symptoms referable to increased intrathecal pressure. Alarming symptoms directly after the intrathecal injection occurred in 2 cases only, thus showing that the gravity method of administration which was not in vogue in the Royal Navy, is hardly necessary provided due care be taken.

[1] Quoted by Herman and Feldstein 'Meningococcus Meningitis,' 1913, p. 282.

Anti meningococcic serum was given hypodermically in 20 cases but as in 4 cases only was it the sole form of specific treatment employed, no conclusions as to its influence can be drawn

An autogenous vaccine was given in 16 cases, mainly by Fleet-Surgeon H C Whiteside, R N, at Plymouth, where the mortality (36 7 per cent) was remarkably low The cases to which auto vaccines were given all received other specific remedies (in 11 cases intrathecal injections of serum), and showed the very low mortality of 25 per cent But as the numbers are small this result—though a further stimulus to its more extended use—must not be insisted on

As already mentioned, somnin appeared to give good results its beneficial effect in the septicæmic stage of the disease was noticed by Staff Surgeon B S Robson, R N., at Haslar, and has also been mentioned by others [1] In one case at Portland Hospital as much as 42 gr of somnin were given Optic atrophy was not noted in any instance

Hexamina was given by the mouth in 7 cases in the hope that as it is secreted into the cerebro-spinal fluid, it would exert a bactericidal action on the meningococci but as it did not appear to have any effect clinically it was soon abandoned

Lumbar puncture which is such an important means of diagnosis, was performed in 149 out of 163 cases, or in 91 4 per cent In 38 cases lumbar puncture was done once only, but 14 of these cases died soon after they came under observation 6 other cases tapped once- died Of 22 cases, tapped twice 8 proved fatal, 2 being very acute 3 tappings were done in 20 cases (9 deaths), 4 in 24 (15 deaths), 5 in 15 (9 deaths) 6 in 6 (3 deaths) 7 in 7 (4 deaths) 8 in 3 (2 deaths) 9 in 4 (all fatal) 11 in 5 (2 deaths) 13 in 1 (fatal) 15 in 1 (fatal) 16 in 1 (fatal), and 17 in 2 (both recoveries) Lumbar puncture appears to be a palliative rather than a curative remedy and to relieve for a time symptoms due to increased intra cheal pressure In 13 cases, of which 4 proved fatal it was the only form of treatment other than the ordinary symptomatic remedies employed-

In 14 cases, 10 of which proved fatal, symptomatic remedies only (such as morphine for pain) were given

[1] Batten *Lancet* London 1915 vol 1 p 986

(V) RECOMMENDATIONS AS TO THE PREVENTION (i) OF CEREBRO SPINAL FEVER AND (ii) OF ITS SPREAD

(i) *In order to Prevent the Appearance of the Disease* the ideal is obviously to avoid the introduction of carriers into barracks establishments, and ships, but as it is impossible to examine bacteriologically all the men at such frequent intervals, so as to detect intermittent carriers (*vide* below), this cannot be attained

Before the occurrence of cases and the isolation and examination of their contacts, the only promising procedure for the detection of carriers would be bacteriological examination of swabs from boys or men who for the following reasons—the presence of nasal or pharyngeal catarrh associated with headache or fever, or the occupation of overcrowded quarters—might possibly be carriers The boys training establishments, especially those such as the "Impregnable,' the "Powerful, and Shotley, where outbreaks have previously occurred are more likely to harbour carriers and originate cases of the disease It might therefore be advisable to examine bacteriologically those boys who develop catarrhal symptoms This investigation should be undertaken some little time before an epidemic may be expected and, judging from recent experience, the most suitable time would be in the month of December In order to avoid the risk of intermittent carriers, namely, those who are alternately positive and negative bacteriologically, *it would be advisable to invalid out of the Service all those who have recovered from an attack of cerebro-spinal fever* It is true that such persons have usually been proved to be negative before leaving the hospital and that the carrier state generally lasts for a short time only—commonly three weeks. On the other hand, periodic or intermittent carriers are known to exist, and if these can be eliminated at the comparatively small cost of invaliding those who recover from the disease (about 74 would be the loss between August, 1914, and August, 1915), a distinct advantage would be gained

Overcrowding should be prevented, and a cubic space of 800 ft per man when the men live, mess, and sleep in the same room, and of 600 cubic ft when they sleep only in the room, should be maintained Steps to remedy the overcrowding in the "Impregnable and 'Powerful, and at the Royal Naval Barracks, Devonport, should be taken without delay Further, when catarrhal diseases break out, the cubic space should be increased by diminishing the number of men in the infected rooms Constant and adequate

ventilation of the sleeping rooms should be [illegible] by the system of night patrols, who see that the windows and ventilators are not closed during the night

As recent recruits are specially picked out by the disease the depressing conditions to which they are liable should as far as possible be mitigated The risk of over-fatigue from unaccustomed drills and route marches should be borne in mind, and especially avoided after vaccination or antityphoid inoculation

As catarrhal diseases, such as influenza, catarrh, tonsilitis, and sore throat appear to play some part in favouring the outbreak of cerebro-spinal fever, and often precede its appearance and coincide with its prevalence every effort to limit their spread should be made Special care should be taken to prevent the common use of handkerchiefs and towels Isolation when possible should be carried out and as already mentioned, the cubic space in the infected rooms should be increased The throats and noses of the patients should be douched or sprayed with a mild antiseptic lotion, such as warm solution of permanganate of potassium 1 in 1,000 When convalescent the men should be carefully protected from fatigue

(ii) *Measures to Prevent the Spread of Cerebro-spinal Fever when the Disease has appeared* —During the late epidemic this problem, which is rendered specially difficult by the exigencies of the service in war-time, was thoroughly taken in hand, and it is therefore unnecessary to reiterate the details and the established routine such as the closing and disinfection of the dormitory in which a case occurs the sterilization of the clothing, beds, mattresses, pillows, sheets, blankets, towels of the patient and of his immediate contacts, and the isolation and bacteriological examination of contacts

The evidence that carriers spring up freely around a case has raised the question if the usual number of contacts sent for bacteriological examination—namely six (the two who sleep and the two who mess on each side of the patient, and his two most intimate friends)—is sufficiently large to catch all the infected contacts Examination of remote contacts has therefore been carried out in some instances in which isolation of close contacts did not arrest the outbreak The success which attended this step at Plymouth and Chatham (*vide* pp 375, 376) justifies the belief that a more extended examination of contacts is desirable This extension might consist in inspection of the remote contacts in the same dormitory and mess-room, and the isolation of those found to have nasc pharyngeal

catarrh until they have been swabbed and proved bacteriologically not to be meningococcic carriers. A list of the friends of the patient might also be made the basis for an extension of the examination of contacts. It would probably be wise to examine ten to twelve contacts as a matter of routine, even when an isolated case occurs. When the contacts are isolated it would be advisable to segregate those with naso-pharyngeal catarrh—and therefore more prone to be carriers—from those in ordinary health. This would tend to prevent the extension of the carrier state among the contacts during their ten days of quarantine. Contacts, and especially carriers with catarrh should be instructed not to swallow the naso-pharyngeal mucus which should be carefully collected and burnt. The urine should be dealt with so as to avoid any risk of infection from this source.

The douching of the nose and throat of contacts and carriers twice or thrice daily should be carried out under medical supervision, and it is important that mild antiseptics only—such as warm permanganate of potassium solution, 1 in 1,000, dilute saline solution, or dilute boracic acid solution, should be employed, and that the more powerful antiseptic solutions, which may impair the resistance of the naso-pharyngeal mucous membrane and so favour persistence of the carrier state or lead to cerebro spinal fever in a carrier, should be avoided. The isolated contacts and carriers should sleep in well-ventilated wards, rooms or tents with ample cubic space, should be as much in the sun and fresh air as possible—exposure to cold, east and north-east winds being avoided—receive a generous diet, and their general hygiene should be carefully supervised. As long as the contacts are isolated in good circumstances, it is not essential that they should be actually in hospital, and a camp or buildings, preferably in the neighbourhood of a medical establishment, would meet the case.

When an outbreak of cerebro-spinal fever is recognized, any case, even possibly of this nature such as toxæmia and severe influenza, especially of the nervous or gastro-intestinal types, should be isolated from the sick bay and catarrhal conditions, such as influenza, catarrh, tonsilitis, and sore throat, dealt with in the manner described above.

It is advisable that swabs from the throats of the surgeons, nurses, and sick berth staff in attendance on the patients should be periodically examined so as to detect carriers; and that cases of catarrh, sore throat, malaise, or headache among those in contact with the patients should be promptly isolated and examined.

bacteriologically, as some of them may be examples of abortive cerebro-spinal fever. Lieut M Culpin, R A M C, F R C S, has mentioned to me cases of this abortive form of the disease among the orderlies in the wards for cerebro-spinal fever at the Alexandra Hospital, Cosham

The arrangements for the quarantine of men before being drafted from infected barracks have been amply justified, for it is most remarkable that from the beginning of the War until August 1, 1915 there were only twelve cases on sea-going ships In the light of this successful result the quarantine, which leaves a wise margin for variation in the probable length of the incubation period, should not be relaxed

THE USE OF HYPOCHLOROUS ACID AS AN ANTISEPTIC IN THE NAVAL MEDICAL SERVICE

By Surgeon H E R Stephens R N

Of all the antiseptics in general use at the present time not one can be described as perfect Each possesses in one form or another an undesirable quality which limits its sphere of action The more powerful germicides are too irritating or even caustic, the milder ones are usually ineffective owing to their lack of bactericidal power while others give rise to symptoms of toxic absorption Consequently the introduction of an antiseptic which is extremely potent yet non-toxic and non irritating, is an advance of vital importance to all and to the Naval Medical Service in particular

As a result of experimental work performed under the direction and powers of the Research Committee of the National Insurance Act, the value of hypochlorous acid as an antiseptic has been brought into prominence by Lorrain Smith, Murray, Drennan, Rettie and Campbell. It is entirely due to their permission that the following results are recorded

At the outset it may be as well to point out that the application of chlorine and oxygen to overcome sepsis is no new invention As long ago as 1846, Semmelweis, the first to apply antiseptics in midwifery, stamped out an epidemic of puerperal fever in Vienna by the use of bleaching powder Eau de Javelle has long been recognized as a powerful disinfectant especially when freshly prepared In all Pharmacopœias of the present day solutions of chlorinated lime chlorinated soda and peroxide of hydrogen find a place Hitherto their practical adaptation to modern surgical technique has failed though the power of chlorine and oxygen as germ destroyers has never been disputed

"Enpad' and 'eusol' are the names given to the new powder and solution respectively The former is prepared by simply mixing in a mortar equal parts of *dry* boric acid and *dry* bleaching powder The fact that the two ingredients should be free from moisture is emphasized, otherwise a reaction occurs and the strength of the powder is diminished A good brand of bleaching powder should be used, such as that manufactured by Steele Victoria Street, Glasgow This has always proved reliable It is put up in convenient ¼ lb packages which cost 1d

Preparation of eusol Add 1 oz of bleaching powder to 40 oz. of water The large earthenware jar supplied to the Service afloat containing methylated spirit has been found most suitable Shake vigorously Add 1 oz of boric acid Shake again Add another 40 oz of water Allow to stand for several hours Shake occasionally Filter through a coarse cloth The resultant clear fluid is the antiseptic solution ready for use

When bleaching powder is added to boric acid and the mixture is moistened, hypochlorous acid is given off as a gas If the water is in excess the gas goes into solution Eusol is merely a solution of hypochlorous acid approximately 0 5 per cent strength This, being relatively stable, has been found to be the most suitable Stronger solutions are apt to lose strength This one remains efficient for a period of three to four weeks

As an example of its power as a germicidal agent we may instance the two following experiments —

(*a*) Anthrax spores are not killed by a 1 in 20 carbolic acid solution under twenty four hours

(*b*) Under similar conditions the 0 5 per cent solution of hypochlorous acid killed anthrax spores under two minutes

Such a marked superiority is hardly capable of belief were it not a fact Here it may be mentioned that in addition to testing the germicidal power on cultures, pieces of putrefying *post-mortem* intestine, both adult and infantile, were used The result of all these experiments has placed beyond dispute the fact, that in the combination of nascent chlorine and nascent oxygen we possess the most destructive means at our disposal against the lower organisms which infect the body

That hypochlorous acid when brought into contact with the tissues in this strength does not produce any toxic effects is not to be wondered at when its composition HClO is considered The blood and lymph are solutions of sodium chloride in which the tissues are bathed Hydrochloric acid itself is manufactured by certain cells for a specific purpose The ions of chlorine and oxygen are of vital importance to metabolism A natural antiseptic appears within the range of possibility It is difficult to realize that this combination of chlorine and oxygen, while acting as a deadly poison to the lower organisms, does not appreciably injure the living cells of the body There must exist some fundamental physiological difference between the microbe and the animal cell to explain this anomaly

The following brief summary of the clinical results is given

We have used eusol as a general antiseptic solution in H M S "Lion" since June 11 1915

Septic Wounds—The routine has been to wash all fresh wounds freely in eusol No sign of pus was seen subsequently From the base surface serum oozed out when redressed It is unnecessary to remove the bandage as the solution can be simply poured on the dressing A specific ulcer cleaned rapidly under its influence. From our experience, limited though it is, the general results from wounds of all descriptions has been to bear out fully the experimental investigation

Boils—After incision these were syringed out with the solution A wick of gauze impregnated with eupad was inserted, they cleaned rapidly. Whitlows were treated in a similar manner

Follicular Tonsillitis—The 0 5 per cent solution appeared more effective in removing the sloughs than the local application of lotio hydrarg perchlor 1 in 1,000 A eusol gargle diluted 1 in 5 was also used It is suggested that this might prove a useful spray to disinfect the nasopharynx on account of the gaseous nature of the antiseptic This might be of special value in preventing the spread of cerebro-spinal fever

Sore Throat—These cases were treated similarly to those of follicular tonsillitis with similar results

Pyorrhœa Alveolaris—The most remarkable feature was the instant disappearance of the heavy sweet fœtor of the breath in these cases The gums took on a healthier appearance and the discharge of pus was considerably diminished Hypochlorous acid appears to be a very efficient weapon against oral sepsis

Impetigo Contagiosa.—An ointment 1 in 5 made of eupad and vaseline has been found effective

From the results obtained clinically over a period of two and a half months we may summarize the advantages and disadvantages, taking the latter first

Disadvantages—(1) Both powder and solution must be kept in stoppered bottles in a cool place out of light (2) The solution readily attacks metallic instruments and fabrics of all descriptions (3) If used in closed compartments the ventilation should be efficient

Advantages—(1) An extremely powerful antiseptic (2) Its effect is purely local There are no toxic decomposition products. Therefore it can be used in bulk over a large area This is a point of the greatest importance in dealing with severe multiple injuries. (3) It is extremely cheap, costing one penny per gallon—at least

150 times less expensive than iodine (4) Simple to prepare (5) Does not irritate the wound A slight tingling sensation may be experienced, but as a rule this passes off in a few minutes If a eusol compress be applied for a long period, there may be some œdema in the skin surrounding the wound This may be prevented by a vaseline smear There is always a flow of lymph from the wounded surface and this forms a natural means of cure (6) The antiseptic action being a gaseous one penetrates deeper than solutions

SURGICAL TECHNIQUE ON BOARD THE ROYAL NAVAL HOSPITAL SHIP 'DRINA.'

By Staff Surgeon R J Willan M S, F R C S Eng R N V R

Hon Assistant Surgeon, and Lecturer in Clinical Surgery to the Royal Victoria Infirmary Newcastle on Tyne.

This monograph has been divided into four sections namely —

(1) A description of the operation theatre

(2) A description of its contents

(3) The preparation of a patient for an operation

(4) The operating technique

The writer's endeavour was to carry out exactly the same operating technique that he uses in his everyday civil life, to fit out an operating theatre *de novo* for the attainment of this was by no means an easy task, for so many of the accessories required were non service ones For the benefit of anyone who might happen to be interested, I have ventured to give, wherever possible, full details of measurements for the most of the fittings described can be readily made in any ship flying the White Ensign I am indebted to Surgeon R H Jolly, R N V R, for his kindness in taking the photographs

Section I

The operating theatre under my charge is situated in the open on the after end of the upper deck There is a similar theatre forward, this is closed at present, but can be readily re opened if the necessity arose Each theatre is adjacent to the upper end of a lift respectively which leads to a ward

The theatre is constructed of wood and is clamped to the deck, the floor only is tiled It is divided into two compartments a preparation room and an operating room, by a sliding door Each room can be separately entered from the outside through wide double doors opening outwards These two separate entrances are to save valuable time during a rush of operating work, e.g., a patient is anæsthetized upon a table in the preparation room, and is ready for conveyance to the operating table immediately this has been vacated (*via* the exit direct to the outside) by the previous patient Each room has an electric radiator for heating

For artificial lighting two separate 'clusters' of electric lamps are suspended from the roof Each cluster is supplied from a *different* dynamo, in case one of the latter went wrong during an

operation which was being performed at night. This theatre proved adequate in every way during the early months of the War and the results obtained were excellent, all "clean" operation wounds healing by first intention.

With the advent of the cold weather however it was found that the patients frequently developed an acute bronchitis after an operation, due to the necessity of transporting them (sometimes in the rain) through the open air to the upper end of the lift *en route* for the ward. To get over this difficulty the kitchen of the ward, where all operation surgical cases are housed, was converted into a temporary winter theatre. This kitchen is merely a corner partitioned off from the ward itself by deal boarding.

The temporary winter theatre had the great advantage of being so close to the ward, but it also had its drawbacks. It contained a hot press (for keeping food &c., warm) heated by steam which raised the temperature of the room to such a degree that on some occasions it reached as much as 95° F. during an operation. In addition to the extreme discomfort to all in the theatre, the results of the wounds were not so good as they had previously been. In three cases wounds which should have healed by first intention did not do so. Eventually I traced the cause to be due primarily to the great heat in the theatre thus dried up the debris so completely that dust was created, and the latter being stirred up by local draughts of air, such as persons moving about undoubtedly infected the mops and ligatures. Antiseptic lotion sprayed on the deck was of little use here on account of its slops. After removal of the hot press the results, with exactly the same technique were excellent.

Briefly, a combined antiseptic and aseptic technique is used. An all-dry aseptic technique can only be successfully carried through under ideal conditions. The operation theatre conditions on board this hospital ship, although good, are not ideal and I therefore feel confident that any technique which does not include antiseptics in its detail is running risks which are not justifiable.

The operating surgeon, theatre sister operation assistant, and instrument assistant all wear caps and masks, also sterilized gowns, sleeves and india-rubber gloves. The patient is completely covered with dry sterile towels excepting the operation area. In addition to this a towel wrung out of a 1 in 20 solution of carbolic acid, for resting the surgical instruments on, covers a portion of the other towels. The surgical instruments, after boiling, lie in a 1 in 40 solution of carbolic acid. Mops used during the operation are kept in a hot solution of normal saline.

Section II

A supply of sterilized water, both hot and cold, is available by boiling tap water in two copper cylinders. These cylinders are identical each has a capacity of sixty pints, a well-fitting lid, also a tap at the lowest extremity projecting laterally, and there is a vertical glass gauge to register the level of the fluid inside One cylinder is marked "cold," the other being marked hot." Each rests on a separate four legged metal stand 24 in from the ground, 9 in from the top of this stand is an iron platform for a Primus stove to rest on The lid is kept secure from the attentions of the unwelcome curious by tying on a jaconet cover The acquisition of these water sterilizers very much increased our efficiency, now we can ensure a supply of sterile water for making lotions and for the irrigation of a peritoneal cavity, &c. Boiled water could previously only be obtained at great inconvenience, because the ship's galley, the only available place in the ship with an open fire, was so inaccessible

For a single operation the operating staff of four persons require sterilizing, four linen gowns, four waterproof aprons, four pairs of linen sleeve armlets, and four waterproof sheets (each one the size of an ordinary towel) for putting around the operating area, together with six towels The waterproof material used for aprons and sheets is batiste sheeting; unlike ordinary jaconet, this will withstand the heat required during sterilizations

The sterilizing of the foregoing is done in oblong shaped boxes measuring 11½ in by 10 in by 8 in (see fig A) Circular sterilizing boxes perhaps look nicer, but the oblong boxes of the same height and width hold such a great deal more These boxes are made of a patent metal composition, which almost indefinitely withstands the wear and tear of constant sterilizations. Fitted inside the box is a detachable wire basket to hold the contents to be sterilized, this basket rests on four loops of wire which prevent its whole floor from resting on the bottom of the box During sterilization the lid is held open by a small adjustable metal slide inside the box the heated air, therefore has free access to every side of the contents of the wire basket The contents of each box are indicated on a tally made of batiste sheeting this is affixed to the handle.

Our sterilizer, which is worked by steam, is housed in an annex of the forward theatre It is made by Maclove, Alliott and Co

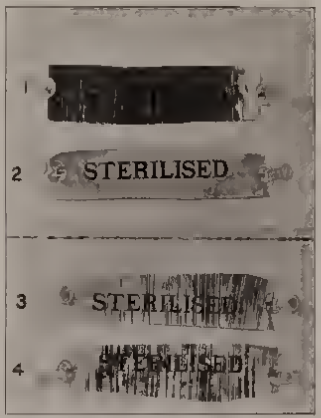
Although we are most fortunate in having such an excellent sterilizer, no means are provided for ascertaining whether it is

always working efficiently. Experience shows that the test employed that owing to even a small faulty detail of construction the necessary heat *inside the steriliser* has sometimes not been attained, and that the contents of the tin could not be sterile. To bring such towels, gowns and sleeves (perhaps badly contaminated at a previous septic operation) in contact with an operation wound is inviting a serious disaster. The only safe way is to ascertain definitely that all the boxes used have sterile contents; this can only be done by testing the result of each sterilization. The test is employed upon one box in each lot sterilized, for if the contents of one are sterile all must be so.

FIG. A. Shows the sterilizing box with the cover beside it, holding the towels, gown, etc. Next to it is the box with the lid closed, but the handles and sides closed and folded with the contents ready for use. To the handle of the latter is attached the brass label stating its contents on which a paper label forming the seal is also shown in the wire basket.

The test consists of an oblong piece of white paper 4 in. by 1 in. with the word 'sterilized' printed in large type across one side. The printed side of the paper is smeared with a mixture of starch, 1 oz., iodine, 7 gr., pot. iodide 7 gr., water to 10 oz.; this when dry almost completely hides the lettering underneath a brownish-black coating (see fig. B, 1). This test paper is placed

in the middle of the wire basket inside the box, being surrounded on all sides by its contents. If the middle of the box (*i.e.*, the site of the test paper) has reached a temperature of 113° C, the test paper becomes decolorized and the printed word 'sterilized"



[illegible] the [illegible] sterility of the contents of [illegible] middle of the contents [illegible], a [illegible] the sheet of the printed word [illegible] test paper after it has [illegible] aperture of at least 115 C has [illegible] and [illegible] completely bleached to the [illegible] subjected to a temperature of 113° C [illegible] sterile and were therefore not safe to use after operation.

appears on a white background (see fig. B, 2). If the required heat of 113° C has not been obtained the test paper will remain its brownish black colour, or perhaps be only partially bleached (see fig. B, 3 and 4). Should the test label not be completely bleached, I use for the operation towels wrung out of a warm 1 in 40 solution

of carbolic acid. A good stock of these carbolic towels are kept in a storage jar.

My colleague Mr. G. Grey Turner, introduced this excellent and simple sterilization test to the Newcastle upon-Tyne Infirmary. He informs me that he saw the method in use in the clinic of Professor Garre, at Bonn.

After removal from the sterilizer the boxes are closed by securing the fastening catches and a printed label is pasted across the junction of the lid with the box to form a seal. The wording on this printed label reads "Sterilized. This box not to be opened until required for use" (see fig. A). The fact of the label being torn across is a reminder to all that the contents of that box are not free from the suspicion of contamination by having been opened, the box is not unsealed until the actual time of usage.

The theatre sister packs the boxes while the actual sterilizing is carried out by the theatre attendant.

Catgut only is left inside wounds, silkworm gut and horsehair are used for approximating the margins of the skin while a sterilized stock of china twist silk is kept ready for use.

A sterilized supply of catgut is kept, four sizes, Nos. 0, 2, 4 and 7 being stocked. For convenience these are arranged on different coloured glass reels, namely No. 0 on a green reel, No. 2 on a glass coloured reel, No. 4 on a blue reel and No. 7 on a white reel. The surgeon readily gets used to associating the different thicknesses of catgut with the correct colours and asks for ligatures or sutures from reels of the particular colour. As a reminder to both the surgeon and the instrument assistant, a list of the colours associated with the different thicknesses is hung up on a side of the instrument table (see fig. D).

Raw unmedicated catgut is converted into sterilized catgut on board by Jellet's method. Under antiseptic precautions the catgut is wound on the glass reels which are then placed in a Jellet's catgut sterilizer. After covering these reels with absolute alcohol the top of the strong brass cylinder is screwed down. Twenty-four hours later the absolute alcohol is poured off and replaced by a fresh supply of the same fluid. After screwing down the top very firmly, the cylinder is completely immersed in a pan containing *cold* water, which is very gradually brought up to boiling point, two hours being the time necessary for this stage. Boiling point is maintained for half an hour, after which the heating agent is removed and the water with the contained cylinder is allowed to cool down. When the cylinder has cooled down it is opened

and the reels are transferred under antiseptic precautions to the wide-mouthed glass storage jars which have accurately fitting lids. Fig. C shows a Jellett's sterilizer, also a storage jar containing some sterilized reels of catgut. These storage jars contain a solution of 1 in 20 carbolic acid but methylated spirits are used for making up the solution instead of water. The catgut is now ready for use. If it has been prepared according to the recipe, a strong pliable sterile suture and ligature material is obtained. If it is boiled or

Fig. C.—[illegible] theatre sister dressed up ready for an operation. Upon her left are shown [illegible] jars containing (marked 1) alcohol, the stock jar for the spirit corrosive gauze; (2) [illegible] for small gauze rings; (3) and a gauze drum (4), each with its tape and bull-dog clip fixed on the top shelf of a Jellett's catgut cylinder (5); and a glass storage jar [illegible] reels of catgut of different sizes (6); on the bottom shelf [illegible] jar containing all appliances for syringe with robinson needle ready attached (7); and a glass jar holding sterile Jellett's catgut drainage tubes (8).

cooled too quickly, brittle catgut is the result. The great pressure exerted by the superheated absolute alcohol (it boils at 173° F.) fully penetrates the whole thickness of the catgut, rendering it sterile.

Silkworm gut and horse-hair are each boiled for ten minutes, while silk is boiled for twenty minutes. Sizes No. 1 and 6 of China twist silk are stocked. These are all kept in the same wide-mouthed storage jar, half an hour before an operation sufficient

carbolic acid (1 in 30 solution) is poured into the jar to cover the contents, at the conclusion of the operation this lotion is drained off. When not in use the glass lids of the ligature and suture jars are anchored down by a jaconet cover.

For any operation cases where there is any cavity, which might harbour a lost mop, special mops are used. These are made by the theatre sister from unmedicated white gauze, which is folded to make thirty-two single layers. Mops in three sizes are used: (1) 4 in. square for ordinary use, (2) 10 in. square, for packing off intestines, isolating the margins of the wound, covering large raw surfaces, &c. (3) strips 24 in. long and 2½ in. wide, for packing into cavities, leaving in as a drain, &c. Firmly sewn to one corner of each mop is a tape 14 in. long to this tape is attached a heavy porcelain ball (in size rather smaller than a golf ball) which is perforated through its middle. These were introduced several years ago by Professor Rutherford Morison of Newcastle upon-Tyne. The porcelain balls hang out of the wound at the end of the tape and are a great additional aid to the prevention of what Mr. Morison terms "mopitis, i.e., the results of the great surgical disaster of the accidentally leaving in of a mop at an operation. Each kind of mop, all complete with tape and ball attached, is tied up in bundles of five, and each variety is stored separately in jars. Not being provided with proper storage jars large glazed butter jars were improvised: the lid is wrapped in a towel wrung out of a 1 in 20 solution of carbolic acid while to further render it dust-proof its top is covered with a well-fitting cover of jaconet tied securely round the neck of the jar. The contents of each jar are plainly painted on the outside. Fig. 6 shows a small mop and a strip each with tape and ball attached. It also shows the storage jars used for the sterilized stock of mops.

The bundles of mops, with porcelain balls attached, are sterilized by boiling in water for thirty minutes after which they are antiseptically transferred to the storage jars which contain a 1 in 10,000 solution of hydrargyrum perchloridum. If the operation case is a clean one the mops used are washed and re-sterilized, if the case is a septic one the porcelain balls are detached for further use and the mops are destroyed.

To those surgeons who are not accustomed to using these balls, or who perhaps have never seen them, they may appear to be cumbersome. This, however, is not so, for one quickly gets used to them and they become just as easy to manipulate as an ordinary mop. The peace of mind they give to the surgeon far outweighs

any trouble the balls and tapes cause him. If mops are accidentally left in a wound, it is usually at an emergency operation, when the patient is very ill and speed is of great moment. As most of the operative work afloat is emergency surgery, I think therefore, that extra precautions have to be taken with the mops. Those counting the mops are only human and mistakes in the "count" can be made. Having the balls which hang out of the wound is an additional precaution, if a mistake were made in the count and if a mop with its tape and ball *did* get hidden in the depths of the wound the matter could quickly be cleared up later by taking a radiograph for the ball would give an excellent shadow. Without such information the presence of a mop accidentally left in might be surmised but could not be proved for, of course, the gauze mop itself is transparent to X-rays.

That such mistakes are occasionally made is common knowledge to the members of the honorary staff of any large general hospital. While a surgical registrar I saw three different patients admitted in one month who had had mops left in at operations elsewhere, these were diagnosed and removed in each case by Professor Morison.

Operation wounds are dressed with "spirit perchloride" gauze. The rolls of unmedicated gauze are boiled for thirty minutes and then stored in jars containing hydrargyrum perchloridum 10 gr. to each pint of methylated spirits.

Everyone in the theatre during an operation wears a cap, a mask and a gown. The cap is a circular piece of linen 18 in. in diameter and with turned-over ends at the circumference to form a slot to take a running piece of tape. The two ends of the tape project from the same small aperture and tightening them converts the flat piece of linen into a cap. In the middle of the cap is a hole 1½ in. in diameter, to add to the comfort of the wearer's head if the theatre is hot. The mask is an oblong piece of linen 6 in. by 3 in. with tapes 18 in. long sewed to each corner. This mask covers the mouth only the nose remaining uncovered. The cap certainly is a protection against loose hair or a piece of scurf falling into the wound just as the mask also protects the wound from any mouth-spray reaching it from the operator or a loquacious spectator. Neither cap nor mask is sterilized. The gowns are the ordinary Service ones, the sleeves are shortened to enable sleeve armlets to be used. It is impossible to provide a fresh sterile coat for each member of the staff for every operation when there are several consecutive ones, the next best thing is to provide each of them with a fresh pair of sterile sleeve armlets for every operation, and this is done.

[illegible] for the sterilization of the bowls, dishes and trays [illegible] in operation, but one of the many well wishers [illegible] kindly obtained for us a large oblong shaped [illegible] tin, 21 in long, 18 in wide and 14 in deep which will [illegible] all the bowls, &c required for an operation It has a [illegible] 1 in in the inside one inch from the top a brass [illegible] on its under surface projects inwards and obliquely [illegible] all around for 1 in this helps to prevent any splashing [illegible] there is a small roll on the ship From the front of the tank [illegible] in the bottom projects a brass tap for convenience of emptying It fits into the top of a wooden frame 15 in high It is kept filled with a 1 in 20 solution of carbolic acid and therefore is always [illegible] ready for use

A good electrically heated sterilizer is provided for sterilizing the surgical instruments It is 19 in long, 12 in broad, and 4½ in deep in its inside measurement Its only disadvantage is that it takes a full half-hour to boil even when hot water is first put in It stands upon a metal topped table adjacent to and on a level with, the top of the instrument table in order to be handy for re sterilizing instruments during an operation In case this sterilizer fails, one heated by methylated spirits is kept in reserve

As there is a thorough current of air in the theatre when both doors are open great care has to be taken that the surgical instruments surgical mops, ligatures &c do not become contaminated with dust when a door is opened To reduce this danger to a minimum two identical wooden tables 31 in high were made The carrying surface of the table measures 36 in by 18 in and securely fixed, and projecting upwards all round the sides of the table top is a continuous sheet of brass 7½ in high A draught-free well is thus produced the floor of this being the wooden table top and the sides of brass On the upper margins of the brass sides of each table are two stout brass rods with tin nail-over ends these are boiled in the sterilizer and are to prevent the carbolic towels which form the roof of the box, from sagging downwards into the contents of the box Figure D gives a side view of one table while above this the other table is seen laid upon its side in order to give a view from above

The mop table ' holds two 20-pint capacity enamelled bowls for the mops also a long narrow enamelled tray with lid to hold the instruments required by the sister during an operation

The instrument table holds an enamelled tray 17 in by 15 in and 3½ in deep for the surgical instruments , a glass tray 7½ in by

6½ in by 1¾ in with [illegible] pairs with which [illegible] ligatures and [illegible] perchloridum solution

The lotions stocked in the theatre are carbolic 1 in 20 solution hydrargyrum perchloridum 1 in 500 and 1 in 5000 solutions and concentrated normal saline solution

[illegible] One [illegible] well [illegible] the [illegible] different coloured [illegible]

For convenience [illegible] ready stocked concentrated solution [illegible] 1 oz of same added to 1 pint of water makes normal saline solution (1 dr to 1 pint of water) This concentrated solution is stored in flat

[illegible] ether bottles which are corked and have a hood [illegible] tied loosely over same. These bottles are almost [illegible] immersed in the sterilizer and are boiled up, as required. [illegible] contents, the cork soon works loose, but is prevented [illegible] by the overlapping hood. When sterilization is completed the underlying cork is manually manœuvred into the neck of the bottle. In practice we have found this much more satisfactory than using the sodium chloride tablets, as the latter take so long to dissolve and in any case they have to be boiled up before they can be considered sterile.

Sterilized india-rubber drainage tubes of various sizes are kept in a wide-mouthed glass jar containing carbolic acid 1 in 20 solution.

The spirit soap used for scrubbing up the skin is made on board by boiling together soft soap 8 parts methylated spirits 4 parts water 1 parts. Only the best soft soap should be used, otherwise the solution is unsatisfactory.

A separate small tray holding two india-rubber gloves, a small pepper-castor containing French chalk, a pot of vaseline, and a pot of soft soap is always kept ready in case the surgeon wishes to make a rectal examination.

For bandaging up an abdominal case I use a many-tailed bandage made from three strips of flannelette: the lowest strip (*i.e.* the one to be nearest the perinæum) is 7½ in. wide, the other two strips being 6 in. each in width. These strips are made to overlap about ½ in. and are sewn together at the portion which lies over the patient's vertebral column.

For thigh and groin cases flannelette roller bandages 6 yards long and in two widths 6 in. and 4 in. are used. These flannelette bandages are very satisfactory; they are made on board, they are cheap, they will wash, they are comfortable for the patient, and they are durable. Further the danger from the material igniting is *nil*, for there are no open fires in the ship and no smoking is permitted under any circumstances in the wards. A cystoscope, a catheter cystoscope, and a urethroscope are kept in the theatre, the illumination being obtained from an eight volt electric accumulator.

Section III.

With regard to the general preparation of the patient for an operation, if there is time for any preliminary preparation he is given oleum ricini 1 oz. overnight, followed by a copious soap and water enema at least four hours before the time of the operation.

Should [illegible] be any question of acute appendicitis neither [illegible] enema is given on account of the danger of the [illegible] in the cæcum helping to cause a perforation of the appendix. A few hours before the time of the operation a capful beef extract is given. A month-wash of carbolic acid 1 in 80 solution is used frequently prior to operation, and if there are many septic dental stumps these are also touched up with tincture iodi. This *must* aid in the prevention of lung sepsis during the stage of general anæsthesia. Half an hour before an operation morphia gr. $\frac{1}{4}$ with atropine gr. $\frac{1}{150}$ is injected hypodermically.

In the local preparation a wide area of skin is prepared. After any necessary removal of hair, the skin is thoroughly well scrubbed with spirit soap and hot water, followed in sequence by the application of turpentine, methylated spirits and hydrargyrum perchloridum 1 in 1,000 solution. A large compress soaked in the latter solution is applied, and this compress is changed a few hours before the time of the operation. If, however, the operation is upon an emergency case, the area is dry shaved and Harrington's solution is applied just before the actual operation begins without any other preliminary local preparation. After leaving Harrington's solution to act for two minutes a little absolute alcohol (or methylated spirits will suffice) is applied. If the best results are to be secured from Harrington's solution it must be applied to a *dry skin*, for it can only satisfactorily penetrate to the deep layers of the skin if it can freely travel between the individual skin cells which may be compared to multiple layers of house tiles. If the skin cells are already sodden the spaces between them are constricted and they do not permit the onward passage of the antiseptic solution to the deeper layers. The formula of Harrington's solution is —

R Sp. vini rect.	64 fl. oz.
Acid. hydrochlor. conc.	6
Hydrargyrum perchloridum	38 gr.
Water	30 fl. oz.

The hydrochloric acid gives finely divided particles of mercury which settle in the deep layers of the skin and forms a most efficient germicide. It is important to remember that this strong antiseptic must not be slopped about, for if it gravitates to the most dependent part where it may remain for any time in contact with the skin, it will produce a severe burn. I first made the acquaintance of this powerful skin antiseptic at the Mayo Clinic at Rochester, U.S.A. in 1909. After a prolonged trial of its use (without any

[illegible] from general hospitals [illegible] for [illegible] wounds [illegible]

Two [illegible] enamelled soap dishes [illegible] sterile [illegible] placed together in front of [illegible] the Harrington's solution and the absolute [illegible] use. The absolute alcohol employed is that [illegible] stage of the catgut preparation.

Before leaving his bed for the theatre [illegible] woollen stockings are put on the patient's lower limbs [illegible] up as far as the groin and keep him warm during and immediately after the operation.

Section IV

Upon receipt of instructions that the operation theatre is required the following routine is carried out.

(1) *The Theatre Attendant* at once (*a*) turns on the heating electric radiators, (*b*) lights the Primus stoves which heat the water sterilizers, (*c*) fills the electric sterilizer with water and switches on the heating current, (*d*) places a bottle of [illegible] saline solution in this sterilizer, (*e*) places all bowls and dishes to be used in the [illegible] tank. These take quite half an hour to fully attain the [illegible] hence the need of attending to them first of all. He also (*f*) gets out the anaesthetic gear, (*g*) wraps the spirit soap, turpentine and methylated spirit bottles (for hand sterilization) in gauze soaked in hydrarg. perchlor. 1 in 1,000 solution, and (*h*) saturates the floor with the last-mentioned solution to effectually lay any dust.

(2) *The Theatre Sister* (*a*) makes all lotions, (*b*) prepares the tables (with carbolic towels) for the mops and for the surgical instruments, (*c*) gets out the supply of mops, and (*d*) gets out the dressings for the operation wound.

(3) *The Operation Assistant* gets out (*a*) the surgical instruments required, (*b*) the ligature and suture jars, (*c*) the india-rubber gloves for the operation.

If time permits the contents of both water sterilizers are re-sterilized at each operation, the contents of the cylinder marked "cold" being afterwards allowed to cool down, the other one being kept hot.

The prepared lotions are stored in enamelled hot water jugs of twelve-pint capacity, a carbolic towel being placed over the top to prevent contamination of the contents.

The mop and instrument tables with high brass sides [illegible] described) are prepared by lining the well formed by the [illegible] of the table and its brass sides, with special large towels wrung out of a 1 in 20 solution of carbolic acid the ends of these towels are long enough to overlap to form the roof of the well and make a closed compartment These towels are prevented from sagging down into the contents of the table by the two sterilized brass cross rods

Just before the operation the Sister makes a rough calculation as to the probable number of each variety of mops that will be required These are antiseptically transferred from the storage jars to one of the empty sterilized large mop bowls The roof of the well is then immediately completed by drawing over the ends of the carbolic towels in order to prevent contamination of the mops

The inside of the top of the instrument table is lined in the same way with carbolic towels as the mop table

Upon a shelf near the mop table is a jar containing the spirit [illegible] gauze for dressing the operation wound also a large [illegible] box containing wool and various kinds of bandages for [illegible] the dressing The boxes with the sterile contents are kept [illegible] stand ready especially for the purpose The india rubber [illegible] gloves are wrapped in a piece of linen with attached tapes for making a secure bundle The outside of each bundle is clearly marked with the name of one of the theatre staff, so that each one gets their own sized gloves They are sterilized with the surgical instruments if gloves are not so wrapped up they tend to be holed by either the instruments or through adhering to the sides of the steriliser After sterilization they are immersed in a bowl containing hydrarg perchlor 1 in 10 000 solution Separate india rubber glove fingers are stored in a small bottle containing 1 in 20 carbolic acid, so that one of them can be drawn over the finger of a glove which was accidentally perforated during an operation

The operating staff for the theatre consists of —

(1) Operating surgeon
(2) Anæsthetist
(3) Theatre Sister
(4) Operating assistant (a First Class S B S)
(5) Instrument assistant (a First Class S B S)
(6) Theatre attendant (a S B A)

The Sister and operation assistant are associated with me in the [illegible] operation surgical ward of the ship The instrument

[illegible] in ther ward and does not come to the theatre until just prior to the operation, his real function at an operation is to prevent the contamination of the stock of ligatures by means of constant drillings in any operation routine this staff work together admirably Everyone in the theatre (operating staff or visitor) wears an overall gown a cap and a mask as previously described (see figure C) These caps and masks are washed each time but are not sterilized All the staff wear rubber boots As valuable time can be wasted by the staff in getting ready for the operation the routine is that the Sister and instrument assistant are the first to scrub up their hands and be dressed up the former must get the mops counted with the theatre attendant, for he is too busy doing other things at a later stage, the latter must get his instruments sorted ready The operation assistant is the last one to scrub up

Above the washing basin is a small shelf for the three bottles containing the solutions to sterilize the hands also a jar holding a nail-brush the latter lies in a carbolic acid 1 in 20 solution Each bottle is wrapped in lint soaked in hydrarg perchlor 1 in 1 000 This enables us to handle the bottles while sterilizing our hands without having an assistant standing by for this special purpose The hands and forearms are sterilized by scrubbing them thoroughly with the nail brush, spirit soap and water This is followed in succession by the application of turpentine and methylated spirits After vigorously shaking the hands and forearms in 1 in 1 000 solution of hydrarg perchlor, the gloves are put on out of a 1 in 10 000 solution of the same antiseptic

The contents of the sterile tins are handled by a pair of Cheatles forceps the beak half inclines in a jar containing carbolic acid 1 in 20 solution when the forceps are not in use Each member of the operating staff is thus handed a batiste apron, a linen gown and a pair of armlet sleeves The shortened sleeves of the linen gown are tucked into the upper wider end of the sleeve armlets the latter are secured in position by means of a sterilized pair of steel hoop trouser bicycle clips (see figure C) To prevent possible contamination of the gloves no member of this staff is allowed to tie any tapes of apron or gown, nor to adjust the upper end of the sleeve armlets

After the patient has been anæsthetized he is transferred from the preparation room to the operating room Special care is taken that the carbolic towels covering the mop and instrument tables are never rolled to one side to expose the contents until the

theatre to [illegible] until all traces of [illegible] transference of the patient [illegible]

The greater number of the surgical instruments [illegible] in a 1 in 40 solution of carbolic acid to [illegible] anti-corrosive fluid which effectually prevents [illegible] other damage to the instruments. The [illegible] and instruments for handling and cutting the [illegible] in methylated spirits in the glass tray. The bowl on the instrument table holds hydrarg perchlor 1 in 1,000 solution for the instrument assistant's hands. The theatre attendant wipes the operation area and if it is an abdominal case he erects a portable wire screen to effectually divide the anæsthetist's domain from the operation area. The two mop bowls are half filled with normal saline solution temperature 105° F. The mops themselves are stored in 1 in 10,000 solution of hydrarg perchlor but with the copious dilution of the normal saline the amount of antiseptic present is quite infinitesimal. Two bowls, adjacent to one another are necessary if an accurate count is to be obtained. The mops are now counted by the sister and the attendant for they are jointly responsible the latter has been taught to call out loudly the number of each mop in numerical succession but not until the mop has been actually transferred to the second bowl by the Sister. Having counted every single mop in use the number is recorded upon a slate placed in such a situation that all can see. If at a later stage more mops are required, the number of the fresh supply is added to that already on the slate. Just before a start is made with sewing up the wound, the sister and attendant jointly count the used and unused mops. I am then informed of the number required to make the count correct. Not until these are accounted for is the wound sewn up, at the conclusion of the operation no further count is made and the final result reported to me. No mop is ever cut during the course of an operation for to do this would confuse the count should a 'strip' be used as drain (to be left in), the tape and ball are not cut off until the wound has been sewn up and not until the final and correct result of the mop count has been reported to me. Also on the mop table is an enamelled tray which holds one pair of Cheatle's forceps two mop holders one pair of scissors lying in carbolic acid 1 in 20 solution. These are for the Sister's use, if required during the operation.

The surgical instruments to be used are already in the sterilizer and only require to be lifted out into their dishes on the instrument

table. All knives, scissors, etc. are wrapped in linen before sterilizing, in order to protect the keen edge from becoming blunted by contact with the other instruments. The lists of instruments for various operations are framed and hung up in the theatre, so that at any time there was a question of a missing instrument during an operation they can therefore easily be checked off.

The sterile lengths of muslin sheeting are now placed around the operation area. The Harrington's solution and absolute alcohol are poured out just before they are required, each solution is applied to the skin by a sterile dry swab. Then the patient is completely covered with sterile towels excepting for the actual operation area around which they (the towels) are anchored to the skin by towel clips. A carbolic towel (wrung out of a 1 in 20 solution) covers a small area of the sterile towels the instruments in use are laid on this *only*. The larger instruments are passed through hot saline solution just before use, and then on the carbolic towel.

The attendant changes the towels as required during the operation, also adds hot saline solution to the mop bowls from time to time to maintain the heat and to ensure that no cold mops are handed to the surgeon. I use hydrargyri perchloridum 1 in 1 000 and 1 in 10 000 solutions in this order for my hands during the operation and always using the weaker solution before continuing with the operation. A squirt gauze dressing is placed next to the wound excepting in a case where the local circulation of the skin has been impaired, in this case I use the same gauze wrung out of this solution. This dressing is covered with wool which has been impregnated with a small percentage of hydrargyri perchloridum.

The subcutaneous infusion when required of saline solution for shock or loss of blood is quickly performed especially at the time of an operation when everything is ready. An ordinary Higginson syringe with a hollow sharp-pointed curved needle fixed in at its outflow end is kept always ready in a glass jar. Its transference to the sterilizer is a matter of a moment, the saline solution is ready and to this I add an ampoule of pituitary extract to each of the two pints I usually inject in such cases.

The patient is transported to and from his bed on a canvas stretcher, with the margins of the long sides of same turned over and sewn to make a compartment to accommodate a detachable carrying pole on either side. An iron spreader at either end keeps the poles apart. The canvas stretcher is left under the

patient during the operation, the poles are removed when he has been deposited upon the operation table itself and they are replaced at the conclusion of the operation

After the operation the Sister packs the gowns, towels, and sleeve armlets into the sterilizing boxes, and sees that all dishes and trays are carbolized before being put away The attendant sends the linen to the laundry, scrubs the used instruments in soap and water and washes out the theatre

In the routine dressings of ward cases I always wear sterilized indiarubber gloves

THE POSSIBLE RECURRENCE OF MEDITERRANEAN OR UNDULANT FEVER AND ITS TREATMENT BY SENSITIZED VACCINES

BY FLEET-SURGEON P. W. BASSETT-SMITH, C.B., R.N.

THE presence of large forces both naval and military in the Mediterranean area with the probability of this continuing for some time, makes it important to consider the possibility of the recurrence in an epidemic form of the disease now generally known as undulant fever, for though this fever has been practically eradicated from both Services for the last ten years it nevertheless is still endemic amongst the native population in many ports and islands.

It may be interesting first to review shortly the past history of the disease which came into notoriety after the Crimean War when we had as now large forces in the eastern portion of the Mediterranean. The accurate history of the disease commences in 1859, when MANSTON, in an Army Medical Report, described the fever, but from a study of the works of HIPPOCRATES there appears little doubt that the disease was present in Greece in his time. During the seventeenth, eighteenth, and early part of the nineteenth centuries many fevers in the Mediterranean region were described but these were rarely differentiated from one another. After the Crimean War a particular disease was recognized among the many men under treatment in the Malta hospitals, which was then distinguished from typhoid and malaria. This was called "Malta remittent fever." In 1886 Bruce discovered the causative organism and described its etiological characteristics. Hughes then, in his classical work gave in detail the clinical and other features of the disease stating that it had existed in Malta and Gibraltar at least since 1800. He introduced the term *undulant fever* which is by far the best title as it does not restrict the disease to any geographical area, indicates one of the most important clinical features, and can easily be written and spoken in any language. During the last century the disease was known to exist chiefly at Malta and Gibraltar, but cases were more or less common in Italy, Greece, Turkey, Asia Minor, Egypt, and most of the Mediterranean islands. It is important at present to note that known endemic centres are Salonika, Constantinople, Beyrout, Smyrna, Alexandria, Cairo

[illegible] Cyprus Candia and Malta One of the important [illegible] factors now recognized is that the disease is not [illegible] originally thought to the sea-ports, but that inland [illegible] severely, notably in Malta island itself and on Italy, [illegible] Corsica, Spain and Portugal the more the disease [illegible] the wider its distribution appears to be The [illegible] the insect is the *Micrococcus melitensis* and its variety *M. para melitensis* which appear as minute cocci or coccobacilli these when introduced into the body give rise to an acute or chronic septicæmic condition The organism may gain access to the body by (1) food, particularly fresh goats milk (2) by infection through the skin or mucous membranes all recent researches have emphasized the importance of recognizing this method in rural districts Wherever goats milk is commonly used in Europe India Africa and America, the disease tends to become endemic though the infected goats themselves rarely show any marked evidence of disease even when the milk is heavily infected with the specific germ, and thus too often a continuous supply of the organism was given in the food to the young and to hospital patients This supply has now been cut off for the Services by prohibiting the use of goats milk and partially to the civil population by the slow elimination of the infected goats and by boiling all milk It must be remembered that cows are occasionally infected and as shown by STRACHAN in South Africa this is due to the close proximity of goats and cows at night the infection being conveyed from the goat to the cow EYRE states that horses mules cows goats, and sheep may all become naturally infected The infection from man and animals chiefly escapes by urine faeces and milk, ambulant cases are not uncommon in endemic areas and are a source of infection There can be no doubt that the present conditions in the Mediterranean region are attended with special dangers The aggregation of large numbers of men who are of different nationalities and habits in small areas under conditions of trench warfare where sanitary measures are extremely difficult to carry out and where flies abound, associated with a high temperature will produce conditions of place which, together with a lowered resistance of the individual brought about by hardships and injuries, must if any ambulant case of infection is present favour the development of Mediterranean fever Not only is it thus not unlikely for cases to develop in the fighting line, but the concentration of the men and women in camps and hospitals at Cairo, Alexandria Lemnos, Cyprus, and Malta, which are endemic

centres, is attended with some danger. We must not forget that though ingestion of infected milk is the most common but not the cause of the disease, unadulterated experience shows that it is not the only way in which products of milk (cream, cheese, etc.) can carry the germ and that the organism is fairly resistant outside the body so that infection by the nose and through the skin and mucous membranes are not infrequent and explain the occurrence of the disease in those who do not drink milk. We must therefore begin with all the persistence we can the utmost importance of the farming those safeguards which have in peace time been so effectual happily these so far under the abnormal conditions have been sufficient. Last year in the Navy there were only six cases and four of these were Maltese. But the *infection is not absent and is under control only as long as a thought of its presence and the necessary preventive measures*. Dr. Smith. The complete medical control of all milk supplies with wholesale sterilization avoidance of the local products of milk, and recognition that the stools and urine may be infective also that disinfection and personal cleanliness are as important for the prevention of undulant fever as for typhoid. In every case of fever of irregular type the blood must be tested for the disease as a routine method and not only fever cases but any showing irregular symptoms with or without neuritis. Major Stephan in South Africa has lately shown how common it is there to see cases apparently without fever who are really infected with the micrococcus, the temperature taken in the morning is normal or subnormal and the rise at night only slight. These intermittent types are well known to the older Naval Medical Officers but we have now another generation who never saw and perhaps hardly appreciate what prolonged ill-health the infection of undulant may cause. For these officers I would particularly sound this warning note.

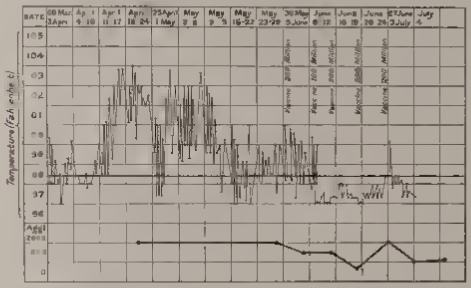
Vaccine Treatment

The first attempt to treat undulant fever with vaccine was carried out by Staff Surgeon Reid, who employed a stock vaccine on nine cases with encouraging results. A little later a systematic trial was made at Haslar by Bassett Smith on sixty one cases in all stages of the disease, using a stock vaccine prepared from a strain isolated from one of the cases, the amount of dosage being guided by the opsonic index which was regularly taken for each case, the agglutination curve being also registered. There was generally a short negative phase, followed by a more or less high

positive one lasting a variable time in accordance with the dose and the condition of the patient

The initial dose was about 500 million organisms and the interval between the injections was ten days The conclusions arrived at were that the vaccine treatment appeared in a certain number of cases to produce a beneficial result, the severity of the symptoms being diminished, the general condition improved, and the duration of the disease curtailed but that in the more severe type of case with high fever and evidence of marked auto intoxication the method had a deleterious rather than a favourable action Experience has shown that the dosage was too large for acute cases

CHART I



Undulant Fever Showing temperature and agglutination curves There was an exacerbation after the pyrexia had ceased and a rapid recovery Chart showing quick reaction to vaccine

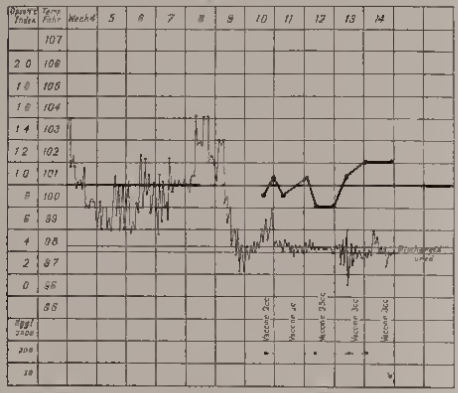
Strachan used vaccines in ten cases, and he states that his results were not inconsistent with those quoted above Wright treated a chronic case with a vaccine and after four inoculations the temperature fell to normal

KENNEDY treated a chronic but severe case with an autogenous vaccine he commenced with a dose of 100 million but obtained better results with much smaller ones 6 to 10 million The temperature fell to normal with six inoculations after thirty days and there was no further rise ALLEN recommends 5 to 10 million in

acute cases and double this in chronic cases. If a stock vaccine has to be used a polyvalent one would probably give better results than when using a single strain.

Recently the use of sensitized vaccines has been much advocated, these were introduced by Besredka, who brought them into general use. They consist of suspensions of killed bacteria

Chart 2



Thin line = Temperature curve. Thick line = Opsonic curve.
Dotted line = Agglutinin curve.

Example shewing quick reaction to vaccine

which have been sensitized by treatment with specific immune serum. The bacteria unite with the specific immune body present in the serum so that the combination is ready to unite at once with the complement of the patient's blood when the vaccine is injected. The disintegration of the bacteria commences at once and produces a more rapid immunity. When unsensitized vaccines are used after injection of the vaccine containing the antigen the tissues have to elaborate the specific amboceptor before the

complement [illegible] The im-
munity conferred is established only [illegible] days, dur-
ing which the resistance of the organisms [illegible] the injection
is accompanied by some local and general [illegible] the negative
phase. The immunity given by such [illegible] is produced
after twenty-four to forty-eight hours [illegible] longer after
the injection accompanied by [illegible] reaction
[illegible] as there is no [illegible] of the
[illegible] the sensitized bacteria at once [illegible] of the
[illegible] and the rapid phagocytosis of their
[illegible] that is the endotoxin is rapidly [illegible] which
[illegible] the formation of antibodies within the cells.

A [illegible] *melitensis* vaccine has been prepared based on the
[illegible] method for the therapeutic use [illegible] of a recent
[illegible] the disease. —

A [illegible] agglutinable virulence was used which had recently
[illegible] through guinea-pigs and rabbits. Agar cultures were
[illegible] deep bottles which were allowed to grow at 37° C.
[illegible] hours the growth was then washed off with sterile
[illegible] killed by heating at 65° C. for half an hour, and
[illegible] with heat-inactivated highly immunized rabbit serum
[illegible] in the right. It was then washed and centrifuged
[illegible] the emulsion of sensitized micrococci was standard-
[illegible] Weight for the last dose for sterility diluted down so that
[illegible] contained 50 million organisms 0·3 phenol
[illegible] and the vaccine was then bottled off. The following
[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	Haemolysis				Result
[illegible]	[illegible]	0·15	0·05	–	–	–	–	Complete fixation
[illegible]	[illegible]	0·1	[illegible]	+	+	+	–	Slight fixation
[illegible]	[illegible]	0·15	[illegible]	–	–	–	–	
[illegible]	[illegible]	0·45	[illegible]	+	[illegible]	[illegible]	[illegible]	Almost complete fixation
[illegible]	[illegible]	0·1	[illegible]	–	–	–	–	Complete fixation
[illegible]	Control	0·1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	0·45	[illegible]	+	+	+	+	No fixation

[illegible] the sensitized vaccine absorbed the greater part
[illegible] but showing that it was almost completely sensi-
[illegible] When tubular unimmune serum was added the absorption
[illegible] complete: therefore when used the vaccine should
[illegible]

[illegible] this test a rabbit was inoculated subcutaneously with

two doses 0 5 and 1 0 c c of the vaccine with a six day interval and after fourteen days the blood when tested gave a positive agglutination reaction up to $\frac{1}{40}$

M para-melitensis

The variations in agglutinability of different strains of *M melitensis* have long been recognized Zammit and others have described a *M pseudo melitensis*, but Nicolle was the first to demonstrate the specific differences of the two forms by means of the agglutination and absorption tests and by animal experiments The abnormal strain had been designated *M melitensis* B it had been originally isolated by Bruce, and subcultures of it have been widely disseminated in the various continental laboratories Nicolle found that the two strains which gave the same cultural reactions were quite different in agglutination tests A would agglutinate with ordinary Mediterranean fever serum to high dilutions 1 in 2 000 whereas B with the same serum would only all act at about 1 in 20 and vice versa In an animal immunized with A culture, its serum would give a high titre with A culture, but a low one with B culture By absorption methods the serum of an animal immunized with A could have all the agglutinins for A removed and still show low ones for B or the low agglutinins for B could be removed with B culture, leaving the high agglutinins for A The reaction I have found also to hold good in a human case of *para melitensis* infection which was contracted at Hyeres, the course of this case was very prolonged but finally recovered under action of *para melitensis* vaccines given in small doses It has been found that goats, especially those in Algeria brought from Spain, were frequently infected with the *para melitensis* strain or with both The use of these two strains for diagnostic work has been the cause of many of the contradictory serum reactions which have been reported

Though the cultural characters of the two varieties are almost identical one notices that on agar the growth is more dense and that morphologically the *para-melitensis* strain is much more definitely bacillary than the true *M melitensis*, and also it is much more easily agglutinated with non specific sera and is more autoagglutinable. Also with it immunization of rabbits is more difficult and the agglutination curve rarely runs so high whether the inoculations are made intravenously or intraperitoneally Examples of immunization are given showing the different reactions in each case

Example 1.—Rabbit, weight 3,850 grm.

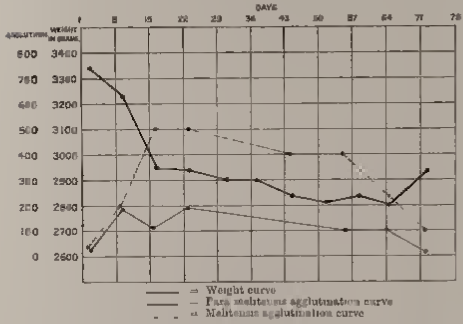
June 2.—Inoculated intravenously with 1 c.c. of a live emulsion of a twenty-four hours' culture of *M. para-melitensis*.

June 23.—The microbe was recovered from its blood.

The agglutination curves for *M. para-melitensis* and *M. melitensis* with the variations in weight of the animal are shown on the chart. Ten heated sera sent for Wassermann tests gave complete negative reactions with this strain at 1 in 40 and upwards.

Chart 3.

Example 1.—Para-melitensis Infection.



Example 2.—Rabbit, weight 3,300 grm.

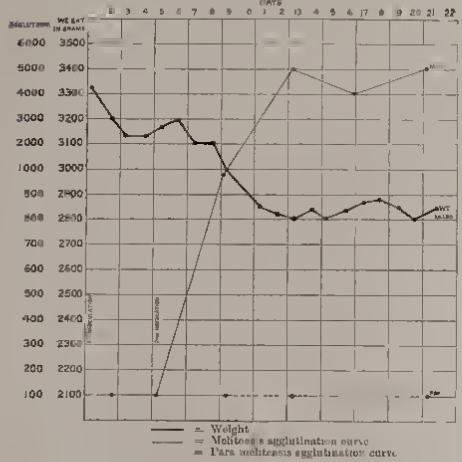
July 3.—Inoculated with 1 c.c. of living emulsion of a twenty-four hour culture of *M. melitensis* which had recently been passed through a guinea-pig.

July 5.—The microbe was isolated from the peripheral blood which agglutinated with the rabbit's serum in a dilution of 1 in 2,000. The animal was heavily infected, lost weight markedly and the titre for the *M. melitensis* ran very high, but that for the *M. para-melitensis* did not rise above 1 in 100. The animal was killed on the 25th, and the specific organism was recovered from the heart, blood and spleen. On examination, the left testicle was

[illegible] agglutinated as a grumous mass, a condition of low agglutinating [illegible]. The strain of *M. melitensis* tested with twelve [illegible] failed to agglutinate any at 1 in 40 dilutions

CHART 4

Example 2.—Melitensis infection



= Weight
= Melitensis agglutination curve
= Para melitensis agglutination curve

and above From these results the specific variation of the two strains seems to be distinctly demonstrated and shows the importance of having reliable cultures for diagnostic laboratory use

THE VITAL IMPORTANCE OF EFFICIENT TRAINING OF NAVAL RATINGS IN FIRST AID

By Surgeon RODERICK J G PARNELL R N

In the *British Medical Journal* of November 21 1914, Sir W Watson Cheyne emphasized some important points in the treatment of wounds received in naval actions His experience showed that —

(1) In naval actions *all the wounds* he had at that time come across *were septic*

(2) The *immediate treatment* of wounds is of supreme importance, for early treatment is the only means of diminishing the likelihood of the occurrence of septic processes–

Concerning the first point, our feelings can be only those of dismay, and it seems an urgent duty for us to consider whether this deplorable state of affairs can be remedied We must consider first of all the conditions under which we work in action Up to the present war, our plans from lack of actual experience had been based on a careful survey of the happenings in the wars which Japan waged against China and Russia Japan learnt by bitter experience the hopelessness of segregating the wounded the medical officers, their assistants and medical stores in exposed positions

We reaped the benefit of such mistakes that were made In 1903 the Durnford Committee laid down many excellent axioms, all of which are well known to naval medical officers Among them must be noted one which emphasizes that *nothing but first aid should be attempted during action* The medical staff with their assistants have to remain below at their stations as long as the ship is fighting, should a lull occur they may be permitted to come up, but then value after the action is so great that it is deemed inadvisable to expose them to danger while the action is in progress Thus at the start it becomes obvious that *the immediate treatment* of wounds will have to be carried out during action *by the men themselves*

Consequent on Sir Watson Cheyne's article the question very properly arises whether our men are properly trained to deal with the situation in a really efficient manner We in the medical profession know how weighty is the problem of dealing with wounds under such conditions Anything short of thorough

training such as we receive as students in hospital is inadequate to deal with wounds under the most favourable conditions, yet upon the shoulders of our men is placed the burden of dealing with severe wounds under conditions than which it is not easy to imagine worse! But it is not with flesh wounds only that they will have to deal. Immediate first aid measures will have to be undertaken by the men themselves to deal with burns, scalds, fractures, and the various degrees of hæmorrhage, all this while under fire and with other duties to attend to! How are they to get the necessary instruction, and acquire the knowledge which alone can fit them for that task? It is a very difficult question to answer—one about which I have often thought—one which is very worthy of our closest attention. It is the medical officer's duty to see that they are fitted for the task which has been allotted them.

As a rule it is considered that any of the numerous subjects which are included in the course of instruction of naval ratings are of far greater importance than a knowledge of first aid whereas actual experience in the present war has shown that a thorough acquaintance with this subject is a vital necessity on the part of every man in the ship. Wounds can only be prevented from becoming septic by early efficient treatment *and this can only be undertaken in action by the men themselves*. Life can be saved by the arrest of hæmorrhage and by the prevention of shock. Surely it is a duty we owe our country to save every life we can, to shorten the period of our man's ineffectiveness through wounds and thus to increase the efficiency of our fighting force. What I plead for most earnestly is the adoption of the following measures which I will call "The ideal to be strived for":

(*a*) First aid to be a compulsory subject in the syllabus of instruction of all naval and marine ratings. The knowledge to be thorough and practical.

(*b*) All ratings to be examined by examiners who have given special study to the subject from a naval point of view. On passing it should be noted on the Service certificate. If a failure occurs it should debar from advancing to a higher rate as would a failure in seamanship or gunnery.

(*c*) Each rating to become acquainted with the practical side of dressing and purifying wounds, etc., by attending for at least twelve occasions at the sick berth of ships and barracks or at the hospitals, where he should be given every opportunity of seeing all types of accidents and injuries. I have thought of bringing this

suggestion forward in a ship, but from opinions expressed I fin that objections would probably come from the men themselves, who would not care for their messmates to be in constant attendance at the sick bay and thus do away with all privacy This does not seem altogether unreasonable though it could be obviated by limiting the cases for demonstration to injuries only.

I attach the greatest importance to the institution of practical instruction on actual cases The men have got to deal with *real* fractures, *real* hæmorrhage and *real* wounds they are instructed only on *imaginary* ones Might we not as well instruct our gun layers entirely theoretically, put them in ships and expect them to work *real* guns (which they see for the first time) and yet to get good results? Really the parallel is not very much exaggerated and it makes one realize the present state of affairs At present we have to be content to do our first aid instruction under bad conditions, for our only means of effecting it is by means of lectures Before describing what has been done in the "Irresistible" I want to say a few words about lectures and class taking in general

First-aid lectures, since we must have them, should be given regularly to not more than twelve of the ships company at a time I find it very difficult to instruct with success a larger number Four classes are taken with each twelve men The subjects considered are dealt with later Suppose then there are 720 men in the ship—that means sixty lots of twelve each—calling for 240 lectures! One begins to realize that there is going to be some laborious work! Averaging two lectures a day it can be done in four to five months this, of course, is working at high pressure but in a commission during peace time every one ought to be instructed in the first year, quite easily, working with but one daily lecture on five days a week Very few ships have such large complements, and in those with smaller numbers the work is proportionately slighter

The duration of the class should never exceed one hour one cannot lay down a fixed time for all occasions for the simple reason that many circumstances are concerned in determining the duration of a particular class Such circumstances include the state of mind or health (on which depends the success) of the lecturer himself One morning he may be able to interest his class for more than an hour without noticing the passage of time another morning his greatest efforts may prove a failure of which he is only too conscious Similar causes may exert their good or baneful

influence from the side of the class. It must be remembered that there is a certain amount of skill required to gain and hold the attention of a dozen young men whose minds are probably set either on some recent happening or on some future event more pleasant than the arduous task before them (the dinner-hour perhaps!). Their attention is probably anywhere except on the matter before them and their mood may be morose ('fed up') or one of "ragging". The lecturer has to be quick to perceive the lie of the land, has to banish undesirable moods, gain the attention of his class and more important still, keep it. To do this requires experience and a knowledge of human nature. Sometimes it is accomplished by means of an anecdote or a reference to some topic of the day which can be made to work in the subject to be tackled. The principal is to make the class turn their thoughts at once on a given matter and keep it there until they are ready to be taken on to the other matter.

First aid lecturing to naval ratings is not at all easy to accomplish successfully. The medical officer who goes to his lectures unprepared is bound to meet with many failures. Experience teaches one that failure is only too ready to appear, unless preparations are very thorough. The various classes differ entirely in intelligence, keenness and temperament; the same class may vary in all these ways on different occasions. The best way to learn is to be always at it and soon it becomes a duty of very great interest.

The language one employs should be very simple, lucidity is the quality to be aimed at, and the lectures should be made as practical and interesting as possible; anecdotes bearing on the subjects should be collected and are most useful to spur a flagging interest.

Scheme of Instruction in H.M.S. "Irresistible".

The Senior Medical Officer handed over to me at my request the entire instruction, and gave me a free hand to do what I considered best as far as was possible under existing conditions. He had already instructed a considerable proportion of the ship's company, but there was a large number of extra ratings, many of them Royal Naval Reserve and Royal Fleet Reserve men, who had never been instructed at all. My scheme was in principle as follows. Four lectures (not longer than one hour each) to every twelve men, until the whole ship's company had been instructed. Working by myself, this would have meant a good six months of work, for it entailed the giving of over 250 lectures. I allow for no lecture on Sundays and

one only on Saturdays Six months than before we could say that everyone was ready, and at any moment we might go into action ' Hence it was necessary to draw up a subsidiary scheme, which took precedence of the original one This was —

(1) Instruction of all officers

(2) Instruction of all guns crews

(3) Instruction of the stretcher parties and men told off to assist at the dressing stations

(4) Instruction of a proportion of the engine room ratings

By the end of the year this was practically accomplished I was given every facility by the Commander and was greatly assisted by the Lieutenant (G-), who himself kept a record of each gun's crews progress. The work was continued—circumstances governing its regularity or otherwise Despite the large number of lectures given the work, far from becoming monotonous carried with it an increasing interest—and the lecturer reaped the benefits of improved delivery and facility of self-expression which constant practice confers

The Four Lectures in Outline

Lecture I—In order really to interest the men in first aid it is very important that the initial lecture should not bore them, but rather it should give them a relish for the three to come. Therefore I devote the first hour to a narration of the way in which first aid has come to be of such vital importance in the Navy I review the Chinese Japanese and Russo Japanese Wars, the horrors which occurred in the first as the result of segregating the wounded in exposed positions, of stores (drugs etc) being destroyed, and of loss of the medical staff through exposure in action the lessons we learnt from the Russo Japanese War, and the important findings of the Durnford Committee of 1903 I impress upon them most earnestly that *they themselves and they alone* will have to render first aid during the action, that it will be no use calling for the medical officers, they must learn to rely on themselves this they owe as a duty to themselves, their own relatives, their messmates and their country How are they to prepare for this? By careful attention at these lectures, in order to acquire all the knowledge they can I then look back on past experience and draw a picture of the probable conditions under which we shall be, and of the various injuries which will most likely occur This includes a consideration of all the circumstances which lead to burns and scalds (high explosive shells, burning paint and woodwork, bursting

of steam pipes etc.) to fractures wounds of a very severe nature, hæmorrhage and shock, just touching on these with a few general remarks

Having thus made up our minds what we are to be prepared for and again laying emphasis on the fact that it is of vital importance for them to learn all they can—since in action they have to help each other—I tackle the first subject, 'Burns and scalds' We consider the causes, dangers and treatment on general lines Shock is mentioned—but I deal with this in greater detail later on, since I find it is not a suitable subject for a first lecture, being not easily understood by most classes The importance of covering up a burn at once is insisted upon—and the various ways in which this can be done are detailed, special instruction being given in the use of the picric acid dressing—I keep one of these dressings open for demonstration purposes This lecture is usually listened to with great interest and sometimes oversteps the hour by a few minutes

Lecture II on Fractures—First a demonstration on the human skeleton—using the diagram supplied Some interesting comparative anatomy points are used to gain the attention while only necessary elementary facts are stated in very simple language Fractures are defined, and the simple and compound variations explained I teach them the signs which are present when a bone is broken, and give them an easy way of memorizing these Having learnt how to tell when a bone is broken I take them on to the first aid treatment Various fractures are imagined Bandages, splints etc., are applied to and by members of the class until proficiency is attained

Lecture III on Wounds—Experiences in the present war culled from medical papers, letters, etc. are narrated, showing how immediate first aid treatment and purification of the wound prevent poisoning, and thus get the men back to the fighting quickly, and so increase our chance of victory Sir Watson Cheyne's sad experiences of naval cases are told them

Signs of poisoning—nature of poisonous germs—how to prevent their access to wounds and how to kill them or prevent them acting if once they have gained admission Necessity of strict cleanliness in dealing with wounds Antiseptics and their use

Lecture IV on Hæmorrhage and Shock—This I find the most difficult of the series, because of the impossibility of making clear in a few minutes the true nature of the vascular system it is all imaginary to them—one cannot show them real bleeding and its actual arrest First, then, I give them a rough outline of the heart

and vessels and their functions Stoppage of all kinds of bleeding by immediate pressure to the bleeding spot—is a maxim I ram well home again and again, similes and illustrations with water-tap are given Compression of vessels by the fingers and by tourniquets next occupies our attention All the principal vessels are compressed—and I do not rest content until each member of the class satisfies himself that the pulse below can be obliterated The signs of internal bleeding are pointed out, and this takes us on to the subject of shock—its recognition and the many means of combating it If time permits I quickly run through the salient points of all the subjects dealt with in the four lectures I call attention to the valuable Service Manual of First Aid which is supplied to the ship's library To this little book I am indebted for many useful hints

At general quarters the Lieutenant (G) arranges with me a number of supposed cases in various positions, to them labels are attached indicating the nature of their injuries Opportunities are thus offered not only for demonstrating the results of strict attention at classes, but of showing independent action in lowering them to the dressing stations It has been interesting to observe the gratifying improvement which has resulted—bad errors are now seldom seen When the cases arrive at the stations I give a short demonstration on them to those who are able to attend—pointing out good work as well as mistakes

I have had excellent opportunities of doing all I could under the present Service conditions and the results obtained convince me that with the adoption of "the ideal I have put forward we should be almost perfect in our preparations for all emergencies

SOME OBSERVATIONS ON MENTAL CONDITIONS AS OBSERVED AMONGST THE SHIP'S COMPANY OF A BATTLESHIP IN WAR-TIME

By Temporary Surgeon THOMAS BLATON, M.D., R.N.
Late Assistant Medical Officer, L.C.C. Long Grove, Epsom.

It is always interesting to observe the psychological reaction of a large body of men when placed in exceptional circumstances and in these times a few remarks as regards the mental conditions applying in my own ship may not be out of place.

Any mental state depends upon or is the resultant of, two or three main factors: first, the type of mind—for the adage that "one man's food is another's poison" is no less true in matters psychological than it is in physical affairs; then the conditions or influences or stresses derived from the surroundings, the circumstances in which the mind is set to work; and finally, the degree and direction of the change in such external influences from what they were previously to what they are at the time under observation. It is as well to consider the material and the previous environment as a preliminary to investigating the reaction under the present conditions.

In this connexion it is found that, in this ship's company, by far the majority of the men are derived from the Royal Fleet Reserve. A considerable proportion are Royal Naval Reserve ratings, and a very few are actual active service men. Most of them are married, and in their shore life have held positions demanding considerable intelligence and necessitating much self-reliance. Some have had a certain amount of responsibility in civic life. It is evident, then, that this ship's company cannot be regarded as if they were a typical naval crew, and therefore their reaction will be different from that of such men when they fall into their new conditions.

From the purely mental standpoint many grades of intellectual development are to be seen, but, on the average, the type is quite high, and, compared with a similar body of men elsewhere, very satisfactory. In only one case that has come under observation has there been any question of actual mental deficiency.

The material, then, consists of a very good standard of man—men from the better part of the working population, who, by

reason of their responsibilities, have made the habit of taking forethought and of acting in accordance with their own considered judgments

Passing, then, to consider the nature of the new influences to which they are subjected, and the reactions which have occurred, it is advisable to divide the time since the beginning of the war as regards this ship into three periods corresponding to position and movement of the ship

First, a long period of over four months, during which the ship was lying in an exposed position on the East Coast second, a short period amounting to two days, while the ship was at sea and the third, another lengthy period of, so far, about six weeks, in the course of which the ship was lying in a protected harbour on the South Coast

Roughly speaking, the influence of the first period was in the nature of a prolonged and monotonous stress Owing to the nature of the position the routine demanded was of an extremely irksome type, consisting of continual watches, night and day, daily repetition of the measures for defence and offence possessed by the ship, and, save for a very occasional route march giving the men two or three hours away from the ship, nothing to break the monotony or give some little change to the environment

Recreation while off actual duty, too, presented many difficulties owing to the need for darkening the ship and the shortness of the daylight at the time of the year

There was the always present possibility of attack by submarine or by ships of superior force at some times more apparently imminent than at others

Apart from these special conditions appertaining in this ship there were many other considerations to be taken into account in dealing with men of this type and it will be best to follow an average man from the time of his joining the ship, in order that they may be fully appreciated

The man takes up his duties, it may be assumed, with more or less eagerness and pleasure, the unpleasant facts of leaving his home and his ordinary life and the possibility of danger in the new sphere, being more than counterbalanced by the emotional satisfaction arising out of the gratification of his patriotic instincts largely influenced by this self satisfaction he smooths over his absence from his home the life on board ship obtains a certain glamour, and the little difficulties to be encountered do not appear on the horizon There is also the feeling of returning again to a life

belonging to his younger days, of which he undoubtedly recalls much that is inviting. He meets a large number of entirely fresh faces and, in the interest to be found in such circumstances his mind is fully employed.

It was remarkable to notice how quickly the men settled down and merged their individuality into the component of the ship's company. Given a short space of time the man has sorted out the new acquaintances into friends and otherwise the novelty of the situation has passed off, the routine no longer demands that close attention which was necessary at first, and there is nothing further to be discussed in the ship. His mind then turns to other more remote matters: the possibilities of the duration of the war: the probabilities of the employment of the ship and the part he himself will actually play in the war. Such topics are naturally of great importance to him, and, consequently, they were discussed everywhere in the ship. Pass along another week or so and these matters have been threshed out to the bone: everyone's opinion has been given in my times over. The newspapers do not help by bringing any fresh material as food for discussion, and he is completely in the dark as to any movement on the part of the ship herself.

It is only to be expected that under such circumstances, discussion of these topics becomes unprofitable and highly unsatisfying. To a man accustomed to foresee his own course of action, it is very difficult to maintain a state of intelligent anticipation with so little material to work upon. More than that, the effort to maintain it in the face of such difficulties, coupled with the feeling of helplessness in his own destinies, becomes an irritating factor the longer it continues.

As a result it was found that, as a subject of general interest, the war and its personal application to the individual ceased to be heard. Instead as a defensive measure, the man adopts a condition of more or less unstable apathy to his future, unstable on account of the setting on one side of his instincts of self-preservation and self control.

In the meantime he has been going on, day after day, repeating the same evolutions of the routine, and though as regards the efficiency of the ship, the automaticity with which these come to be performed is very desirable, from the individual's standpoint the results are not so happy. Apart from the actual time while on duty, the man has nothing of importance in the ship left to think about. The effort too, at maintaining a sufficient interest in so

monotonous and trying a routine becomes a steadily increasing stress as time goes on

Consequently, as the man has been accustomed to think, and subject-matter for thought must be found, he turns to the relatively unimportant things of daily life as a relief Now, any event, however insignificant, under these circumstances is liable to assume an importance entirely out of all reason when it occupies so relatively large an area of the destitute mental field The imagination in dealing with such petty matters may easily become distorted, and whether the distortion will proceed in an exalted or depressed direction depends largely on the tone of the background on which the thoughts are spread

It will be seen from the fact of the underlying stress and the failure of satisfaction of the primary instincts and habits of the man that the emotional background is more likely to be dark than bright The disproportion will therefore probably exist in a direction tending to produce a state of anxiety and distress of the mind It must be remembered that this anxiety, though outwardly attributable to the insignificant event is in reality the outward expression of the general dissatisfaction of the mind

The extent to which the lack of proportion will proceed now becomes a pure factor of the individual, and it is in those men where a morbid tendancy already exists that the distortion will occur in the highest degree There is no question of attributes such as courage and loyalty in the matter given a well developed imagination and the faculty of viewing events in a critical spirit, the very fact of a man's zeal and his desire for action will help rather than retard the morbid process

The attendance at the sick bay towards the end of the period under discussion showed quite plainly the necessity for taking these considerations into view in dealing with the various minor ailments and injuries which came under notice Mild conditions of neurasthenia with hypochondriacal ideas were prevalent Minor accidents all had a mental sequence of some kind Most striking of all was the occurrence of a hitherto unsuspected case of general paralysis of the insane in an apparently healthy man who sustained a small injury to a finger, severing a tendon The tendon was sutured and the wound healed perfectly but during the period of convalescence the patient attracted observation, and it was found that he presented the Argyll-Robertson pupil, the markedly increased reflexes, etc., of the general paralytic These, of course, probably did exist to some degree beforehand, but the interesting point was

the rapid advance of the disease dating from the trivial injury In other cases conditions occurred which could only be described as of slight traumatic neurasthenia

The second period of time, when the ship put out to sea was productive of very striking effects On the one hand it came as a welcome relief from the terrible monotony of the first period and the possibility that the ship might have been proceeding to take an active part instead of passively awaiting attack, might be relied upon to revive the patriotic emotions which had suffered from want of fuel On the other the risk to the individual was apparently much greater, and if the deterioration due to the first period had proceeded beyond a certain limit, then the additional acute stress might prove disastrous Both of these suppositions were found to apply as a matter of fact

By far the majority of the men showed appreciable relief—a general rising of spirits was to be noticed Work was carried out with an eagerness belonging to the early days of the War and altogether a sense of satisfaction could be felt throughout the ship

In one case, however, a fatal result ensued, the man severing his carotid artery on the second morning at sea In another severe emotional crisis arose, attributed by the man to an alteration in his home affairs of which he had just heard In others the intensity of hypochondriacal ideas in cases under observation became much greater

What the effect of a prolonged period at sea would have been is extremely difficult to forecast probably the two sides of the question would soon balance up again the men would soon become accustomed to the new conditions, and would, no doubt, recover their usual tone

However, there was no opportunity to judge of this The second period was of very short duration and the third period of lying in a protected harbour commenced

Here there is a very different picture the men are not continually subjected to the stress of imminent danger, the exercises and manœuvres which they carry out are purely exercises and do not demand the strain of attention as they did formerly, and of most importance they can now have a little—very little, though under the circumstances—time on shore, away from the ship and its discipline

In nearly every way this is beneficial, physically the cramping effect of life on board ship becomes relieved, and, more important still, the cramping mental effect also passes away in the intercourse

with new people They meet new faces, can form new associations for themselves, and this expansion of the mind is of very great value

Briefly to review the whole period it is seen that the psychological conditions consisted of a prolonged and monotonous stress, followed by a sudden increased stress and then by a quiescence as regards the present, the only worry existing in the future

It may be said that so far the men have come through exceedingly well, mental troubles of a really serious nature having occurred in less than 1 per cent of the ship's company while the mild neurasthenic conditions amounted to under 3 per cent or 4 per cent

The conclusions to be drawn can only be that such lengthy periods as the first four months under the conditions which prevailed in the first part of the War are highly undesirable and should be prevented if military exigencies will permit All the attention possible should be paid to the need of change in the mental environment while the men are under the influence of such continued stress especially as adequate recreation could not be obtained owing to the military precautions necessary in such a situation

That the results were not more regrettable can only be due to the standard of the men and their *moral* and of that nothing too good can be said

Editorial.

THE NAVAL MEDICAL COMPASSIONATE [illegible]

We drew attention, in our April number, to the [illegible] arrangements for increasing the scope of this fund [illegible] popularity in the Service were nearing completion, that the [illegible] Parliament governing the Fund had been repealed, and that the revised rules only awaited the final approval provided by [illegible] in Council.

We are glad to be able to state that the proposed Order in Council has now been approved.

A glance at the appended rules will show that Medical Officers who now join the Fund will derive many great advantages. The interest on the sum of £10,600 at present standing to the credit of the Fund together with the amount accruing from [illegible] tions will be available for distribution amongst the widows and orphans of subscribers while in future the yearly subscription will be only 2ls.

Seldom does such an opportunity occur of making, at a small cost some provision for wife and family in case of need, and it is anticipated that under such favourable conditions many Officers will now join the Fund. The hope may be expressed that those who happily are possessed of means to provide adequately for the future of their families may also become subscribers and so help a very deserving cause.

It is intended to admit subscribers under these new conditions as *from January* 1, 1915 *and Officers are now invited to notify the Hon. Secretary Naval Medical Compassionate Fund Medical Department, Admiralty of their intention to join.* In due course, however, copies of the appended rules etc. will be forwarded to all Medical Officers on the Active List.

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[1] Since the year 1817 the title has been "The Naval Medical Supply and Compassionate Fund" but now the more correct designation is "The Naval Medical Compassionate Fund."

Seventy-[illegible] and Regulations for the Constitution and Government of the Naval Medical Compassionate Fund

(1) The management of the Fund shall be vested in a President who shall also be a Trustee, two other Trustees, six Directors, an Honorary Treasurer and an Honorary Secretary. These or any three or more of the Directors mentioned in Article 3 hereof, shall constitute a Court of Directors.

(2) The person holding the office, for the time being, of Medical Director General of the Navy shall be the President and a Trustee of the Society. The persons holding the offices for the time being of the Secretary of the Admiralty, and of Director of Greenwich Hospital, respectively shall be Trustees of the Society.

(3) Notwithstanding the provisions of Article 1, the existing Directors of the Fund may continue to act as, and be Members of the Court of Directors until their death or voluntary resignation, and may attend and vote at any Meeting of the Court of Directors.

(4) The Court of Directors shall co-opt from amongst the subscribers to the Fund not more than three persons as Directors who shall hold their office until three months after the termination of the present hostilities and in the event of any vacancy amongst these three Directors, or of the total number of Directors becoming less than six before that date shall similarly fill the vacancy by co-optation from amongst the subscribers to the Fund. Thereafter the members of the Fund shall annually elect from among their numbers six Directors at a meeting to be held for that purpose in London at a time and place to be fixed by the Court of Directors and announced by advertisement in the medical papers.

(5) The Fund consists of the sum of £10,600 2½ per cent. Consolidated Stock now standing at the Bank of England in the names of William Harris Lloyd, Walter Reid, and Theodore Julian Preston, of whom the aforesaid Theodore Julian Preston is now deceased which shall be vested in the Trustees provided for in clause 2 without conveyance or assignment and of any further sum or sums that may have been or may hereafter be, donated to the Fund and which shall be invested in the names of the Trustees in such trust stocks or investments as the Court of Directors may approve.

(6) The interest on the above sums and the annual subscriptions hereinafter provided for, shall be distributed by the Court of Directors among the eligible applicants for assistance at meetings to be held in the months of January, April, July and October in each year. Provided always that the necessitous orphans of deceased and present members of the Fund shall have the first claim to assistance from the proceeds of the interest on the sum now invested as described in clause 5.

(7) Medical officers on the Active List of the Royal Navy may become Subscribers to the Fund, but officers who have subscribed to the Fund while on the Active List may continue as subscribers after being placed on the Retired or Reserved Lists or after resignation of Commission.

Historical.

SIR WILLIAM BEATTY, M.D., F.R.S.,
SURGEON TO H.M.S. 'VICTORY' AT THE BATTLE OF TRAFALGAR.

By S. D. Chillingdall, M.D., F.R.C.P.

He [illegible] served his country faithfully and on all [illegible]. It may be [illegible] that his whole professional life was an exemplification of what is best in Nelson's last and ever memorable message to the Fleet.

So it was the opinion of Sir William Beatty, expressed in the time [illegible] by the *Gentleman's Magazine*, and it is probable that no [illegible] uttered by that classic periodical has been more deserved [illegible]. In the following memoir the writer has to express his [illegible] to Dr. H. R. Popham Baker of Blackheath, who has [illegible] accompanying portrait, and the following pedigree to Mr. [illegible] Baker of Ryhenden, Kent, who photographed the original [illegible] and copied the pedigree, and to Mrs. Charlotte Frances Baker [illegible] Col. F. W. Baker, who kindly allowed both portrait and [illegible] used for this purpose.

Pedigree and Family History.

[illegible] of H.M. Customs, Londonderry, m. Ann Smyth [illegible] of William Smyth (who d. April 6, 1820) and sister also of Dr. [illegible] Smyth, F.R.S. They had issue:—

(1) [illegible] Beatty, M.D., b. [illegible], unm., and interred in [illegible] to William IV. and to the Greenwich Hospital Surgeon to [illegible] at Trafalgar. Knighted May 25, 1831. Wrote the [illegible].

(2) [illegible] Captain, Adjutant to the 24th and 25th Light Dragoons [illegible] Irish Dragoons. Served in Lord Lake's campaign in the [illegible]. Invalided from the Service, in October 26, 1812. Believed [illegible] unmarried, but left no issue.

(3) [illegible] C.B., R.M., b. [illegible]. Was especially appointed to command [illegible] Marines in H.M.S. Northumberland (Admiral Sir George Cockburn) [illegible] and took Napoleon to St. Helena in 1815.

(4) [illegible], Chancellor of Bishop's Square, Londonderry, b. 1781, d. November 7, 1815, unm. Obituary notice in *Londonderry Journal* of that date.

(1) [illegible] Mary-Ann, 1782, [illegible] on July 11, 1805, John Deppeus Baker, Commander R.N. (b. June 24, 1784, d. April 26, 1850). [illegible] Ann Abraham Baker, D.C.L., Wadham [illegible], All Souls, Coll. [illegible], Vicar of Marksbury, Rector of Burnal and [illegible] of Bedminster, Prebendary of Wells, J.P., D.L. for co. Somerset. They had issue only son, the Rev. Frederick Walter Baker, M.A. Cantab. Coll. Camb.

(2) *Thomas* b. [illegible] 1809, m. December 1 1840 [illegible] Johnson, Robert Bruce [illegible] September 4 1871, Rector of Muff, Donegal and Archdeacon of Londonderry (his mother died July 1 1871). They had sole issue —

Elizabeth October 11 1841 William Carlisle Henderson of [illegible] barrister at law

II. *Mr Beatty* of [illegible] to James Beatty of H.M. [illegible] died aged 40 leaving issue —

Captain Vincent Beatty

Mr Smyth of Cromore, Dun

Note —Lieut. Michael [illegible] December 8 1812 left Anne Baker the portrait of her brother Sir W. Beatty.

There is little to add to the above pedigree. Neither it nor any of the published biographies of Sir William Beatty give the date of his birth. An examination of the family documents, however, shows that he was 69 at the time of his death in 1842, so that the year of his birth would be 1773.

The Beatty family appears to have the greatest antiquity. Mr John O'Hart, in his "Irish Pedigrees" writes "Geoffry, one of the Princes of Scotland who settled in the Deisi, in the time of Brian Boru fought at the battle of Clontarf in 1014, was the ancestor of Balagh, modernized Beattie and Beatty." Mr O'Hart further states that the family name is derived from the Irish "Biadach" (beeadha) a public victualler or keeper of the hostel attached to a monastery. In this statement Mr O'Hart is supported by the Rev. Henry Barber, M.D., F.S.A., in his work on "British Family Names".

Sir William Beatty's Early Education and Medical Training

Nothing seems to be known as to where Beatty received his general education. He probably received it locally. That he was well educated we know from his writings. Nor is any information forthcoming as to where he received his medical training. He probably received it by that good old style—apprenticeship. Yet he must have somewhere gone through a course of dissection, for his knowledge of anatomy, as is shown in his description of the cord, is taken by the bullet which killed Lord Nelson is admirable.

Sir William Beatty was not a member of the Royal College of Surgeons which was founded in the year 1800, nor of the body which preceded it, the old Corporation of Surgeons. He did not, in fact, receive any qualification as we should call it in these days, until he had practically finished his active career. He became M.D. of the University of St. Andrews October 11 1817, and on December 22, of the same year became a Licentiate of the Royal College of Physicians of London (on this latter diploma he passed the usual three examinations, his examiners being Sir Thomas Pepper Pegge, Regius Professor of Physic, Oxford, Dr. Thomas Turner, Dr. John Ayrton Paris, and Dr. John Noble Johnson).

Information kindly supplied by W. H. Willcox, Esq., Secretary of the College.

Naval Career

Surgeon [illegible] probably served an apprenticeship to [illegible] Hopkinson of Mark but unfortunately no record [illegible] long this has been [illegible]

He [illegible] commission December [illegible] 1793 [illegible] appointed Surgeon [illegible] Thunderer Dublin Mr [illegible] transferred to [illegible] Augusta on September 23 [illegible] Amethyst on March 26 1796 to the Alcmene Whilst in his second [illegible] Instead named vessel Dr Forbes [illegible] furnished [illegible] note which he found in the [illegible] Lieutenant Colonel John Popham Baker [illegible] at the commencement of the [illegible] found the Master [illegible] in which ship he [illegible] independence [illegible] absolutely liberal and [illegible] He remained on the Alcmene until May 21 1797 when he was [illegible] to the [illegible] and on July 3 1801 he was transferred to the Spencer [illegible] on to which he remained until transferred to the Victory

His appointment to the 'Victory' took place December 11 1803 and according to [illegible] work was made by the Admiral (Lord Nelson) himself who had given the previous surgeon Mr George Magrath the Surgeoncy of the Naval Hospital at Malta

On board the Victory Beatty had as assistants Surgeons Smith and Westmacott but on the evening of the battle of Trafalgar October 21 1805 he was joined by Surgeon Button of H M S 'Pickle' who came on board to assist in the heavy casualty work Mr Button returned to his own ship three days later namely October 24 [1]

Casualties on Board the 'Victory'

These are all carefully recorded by Beatty in his Journal The nomenclature and phraseology of this Journal are very similar to those used at the present time and the description given by Beatty of his cases shows that he had a good practical knowledge of anatomy pathology and surgery

Beatty divided his Journal into two parts the first part dealing with the casualties which occurred prior to the Battle of Trafalgar and subsequent to his appointment as Surgeon in December of the previous year the second part dealing with those casualties which were received during or following the Battle of Trafalgar and until the vessel was put out of commission at the end of the year 1806

Each part of the Journal is followed by a Summary In the summary of the pre Trafalgar period Beatty states that the casualties amounted to only five deaths and two hospital cases Of the fatal

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[1] Surgeons Sick & Hurt Board's MS volume in the Public Record Office

[2] By direct reading of the Journal it is known that at the time Beatty was transferred Surgeon Magrath was on shore sick and he was not able to return to duty

Sir Nicholas Harris's Dispatches and Despatches of Lord Nelson

[3] Surgeon Beatty's Journal MS volume in the Public Record Office

Beatty's Journal MS volume in the Public Record Office

cases, one died of fever, three of consumption and one from injury to the spine. The hospital cases were consumption and were sent to Gibraltar Hospital. In the summary of the *post*-Trafalgar period Beatty states that as a result of the Trafalgar action there were, in all, 102 casualties. There were five deaths on board and one at the Naval Hospital, Gibraltar. "All the others got well on board, except five of the worst cases who were left behind at Gibraltar, and five others who were not well of their wounds when the vessel was put out of commission at Chatham and were transferred to the hospital ship 'Sussex' lying off Sheerness."

The five fatal cases on board the 'Victory' were as follows:—

(1) "Midshipman Alexander Palmer was shot in the right thigh by a musquet ball. Bone and large vessels untouched. Died October 28 (seven days after injury) from tetanus. Cold affusion and large doses of digitalis and opium were tried in this case."

(2) Henry Cranswell, seaman. "Simple fracture of the tibia and fibula with several severely contused wounds on different parts of the body. Died on October 26 of gangrene."

(3) Joseph Gordon, seaman. "Amputation of thigh. Died of sudden spasm, October 27."

(4) William Brown, seaman. 'Grape shot through the inferior part of the left cavity of the thorax. Died October 23, of internal haemorrhage.'

(5) Richard Jewell, seaman. "Amputation of the thigh through the trochanter. He had lost a great deal of blood before he was brought to the cock pit. Died October 22. This man died shortly after the operation from the great violence he had received and from the removal of so great a part of his body."

Beatty's Journal is silent with regard to his chief casualty, namely the wound and the death of his great Admiral, Lord Nelson. His report upon this case was contained in a special document which is embodied in Beatty's well known monograph the "Authentic Narrative."[1] Concerning this narrative it seems right to point out that it appears to be relied upon as the most authentic account of the Battle of Trafalgar. Most historians refer to it and Sir Nicholas Harris in his voluminous work makes thirty nine references to it and quotes whole paragraphs *verbatim*."

Lord Nelson's Death

On the morning of the day on which the battle of Trafalgar was fought (Tuesday, October 21, 1805), Lord Nelson was in excellent spirits, for he felt that before the day closed a decisive victory would

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[1] "Authentic Narrative of the death of Lord Nelson, with the circumstances preceding, attending and subsequent to that event; the Professional Report of His Lordship's wound and several interesting anecdotes. By William Beatty, M.D., Surgeon to the Victory in the Battle of Trafalgar and now Physician to the Fleet under the command of the Earl of St. Vincent, K.B. &c., &c." London 1807. (Twice republished.)

Sir William Beatty was not the first military surgeon to record an medical events of a personal importance. To John of Ardern, Surgeon to the Black Prince, and present with the Prince at the Battle of Crecy, we owe entirely the story of the Prince of Wales's pierce and the blind King of Bohemia.

[2] Sir Nicholas Harris, G.C.H.G. "Letters and Despatches of Vice Admiral Lord Viscount Nelson," 7 vols., 1845.

most probably rejoin the fleet under his command He had said the night before to a group of midshipmen "Young men to morrow will be a fortunate day for you" In this state of elation therefore, it is not surprising to learn that he insisted on donning prior to the battle full naval uniform excepting only his sword which he is supposed to have forgotten for it was found afterwards lying upon his cabin table Upon his left breast he fastened the four decorations to which he was entitled, namely, those of the Orders of the Bath St Ferdinand The Crescent, and St Joachim Of these he valued most highly the Star of the Bath and this he placed nearest his heart His chaplain and his secretary remonstrated with him for his foldness pointing out that he was simply providing an admirable target for the enemy s fire and suggesting that he should at least cover his decorations with a handkerchief but he refused saying In honour I have gained them and in honour I will die with them His determination to appear in battle so attired occasioned great consternation to the other officers but none dared to approach him again on the subject except his Surgeon, Mr Beatty (who felt that he was sufficiently familiar with the Admiral to do so) and who intended to do so, but unfortunately no opportunity presented itself, for the battle was soon in full swing

The opposing ships were in close contiguity in fact it was almost possible to leap from one to another The enemy ship that lay alongside the 'Victory' was the Redoutable, and upon the mizzen top of this vessel were posted two seamen who were furnished with short fire arms of some sort, either pistols or muskets Lord Nelson was on the quarter deck of the "Victory" talking to his Captain Sir Charles Hardy and of the men in the mizzen top of the 'Redoutable' recognizing Lord Nelson by his costume took steady and fatal aim, the distance it is computed being not greater than 15 yards, and the bullet entered just below the left epaulette The man were immediately dismissed by an officer on Nelson s ship one fell dead from the mizzen top the other was shot while escaping down the rigging

The course taken by the bullet after entering the Admiral s body is best described in Beatty s own words[1] 'The ball struck the forepart of his Lordship s epaulette, and entered the left shoulder immediately below the processus acromion scapulæ which is slightly fractured It then descended obliquely into the thorax, fracturing the second and third ribs and, after penetrating the left lobe of the lungs and dividing in its passage a large branch of the pulmonary artery, it entered the left side of the spine between the sixth and seventh dorsal vertebræ fractured the left transverse process of the sixth dorsal vertebra, wounded the medulla spinalis, and fracturing the right transverse process of the seventh vertebra, made its way from the right side of the spine directing its course through the muscles of the back and lodged therein about two inches below the inferior angle of the right scapula On removing the ball a portion of the gold lace and pad of the epaulette together with a small piece of his Lordship s coat was found firmly attached to it (see sketch)'

[1] It is obvious that the greater part of the hæmorrhage took place within the thorax Lord Nelson had thereby received upon his coat much blood from the wounds of his Secretary Mr Scott, who when shot was standing close to him On being taken

Before being carried [illegible] that a handkerchief might be put over his face [illegible] the ship's means for hiding his features from [illegible] which he had declined to use for hiding his decorations [illegible]

On being examined [illegible] Lord Nelson said "Ah Mr Beatty you can do nothing [illegible] been shot through the spine I knew the symptoms [illegible] had had them explained to me by Beatty in the [illegible] case mentioned in Hume's first Surgery [illegible] similarly injured As a result of this [illegible] Nelson [illegible] completely paralysed [illegible] certain point [illegible] sensation [illegible] nerves in the case [illegible] the position [illegible] nerves of course practically [illegible] the position of [illegible] definitely and if it had [illegible] to attempt successfully or [illegible] fully [illegible] He [illegible] heard him great thirst [illegible] by the loss [illegible] felt [illegible] into his chest with [illegible] pain [illegible] [illegible] home with [illegible] thing mounted [illegible] mounted

[illegible] Lord Nelson [illegible] drawn by Mr Beatty showing [illegible] William [illegible] bullet entered [illegible] fatal [illegible] subsequently [illegible] following

The Voyage Home

When he felt [illegible] real approach Lord Nelson had said to his Captain "Do not throw me overboard Hardy If the people [illegible] to bury me in St Paul's but my body taken to my father's country at Burnham Thorpe" In compliance with his lordship's wish [illegible] store it became necessary [illegible] on to do something to preserve [illegible] body Therefore [illegible] on board and it is doubtful [illegible] understood the reasons The one thing possible was to preserve the body in spirit A wooden coffin would of course be useless for the spirit would percolate through and there was no lead on board from which [illegible] could be made Procuring, therefore the largest cask on board, [illegible] filled [illegible] Beatty had this filled with brandy and into

[illegible] Nelson [illegible] upon the ground and on it was placed Vidaliapunan [illegible] Cap[illegible] Adam [illegible] who was bleeding profusely So that it is extremely [illegible] that the blood [illegible] on the coat shown to visitors at Greenwich are [illegible] collateral [illegible] blood

[illegible] Nelson had a request against being buried in Westminster Abbey because [illegible] had that it was likely upon a march (which [illegible] and might some day be [illegible] (which is improbable)

[illegible] the Admiral's [illegible] [illegible] had [illegible] [illegible]

[illegible] the [illegible] [illegible] taken to [illegible] When [illegible] [illegible] up and [illegible] departure to [illegible] experienced [illegible] had weather [illegible] before she [illegible] the English Channel [illegible] [illegible] the body was twice [illegible]

On [illegible] at Spithead Beatty [illegible] the body and [illegible] from the [illegible] the opinion that the intestines [illegible] He, therefore, decided to open the [illegible] He took [illegible] of [illegible] Nelson had [illegible] almost [illegible] For [illegible] neither flesh [illegible] It is no [illegible] Beatty found all [illegible] took this opportunity [illegible] the [illegible] described with [illegible] official report.

Beatty of course retained the bullet, and the subsequent [illegible] of this missile will be found in a notice in "Notes and [illegible]" December, 1852, to which the writer's attention has been [illegible] by Dr. Popham [illegible]. From this account it would appear [illegible] presented the bullet to Captain Hardy, who had it mounted in crystal and silver and returned it to the surgeon, and he for a time wore it as a pendant. It then passed into the possession of the Rev. [illegible] W. Bak[illegible], Rector of B[illegible], Hants, Sir William Beatty's nephew. Subsequently the family, through Lord Haddington, First Lord of the Admiralty, presented it to Queen Victoria, who had it placed in the Armoury, Windsor Castle, where it may now be seen.

It might be supposed that Lord Nelson's body would have been landed at some port on the South Coast. This, however, was not done, but a leaden coffin was sent on board into which the body was placed, outside which was a wooden coffin made from "L'Orient," the ship of the French Commander-in-Chief at Trafalgar.

The "Victory" sailed up the Channel round the Forelands and into the Thames, where it was met by Commissioner Grey's yacht, which conveyed the Admiral's body to Greenwich, where it lay in state for three days prior to being buried in St. Paul's Cathedral.

It is beyond question that Beatty followed the body of this great patient to its final resting place. The *Times*, however, in describing the funeral *cortège*, simply has this line:—

"Physicians in a Mourning Coach."

Sir William Beatty's Career subsequent to Trafalgar

It is much to be regretted that so little seems to be known of our surgeon's career after his return to this country in 1805, and before his appointment as physician to Greenwich Hospital in 1822. Fleet Surgeon W. L. Martin, one of the editors of this Journal, with the assistance of the Admiralty Librarian, has laboriously and most kindly searched the official archives without result, and the writer has examined the *London*

Gazette and the *Times* newspaper for the same period without success It is probable that Beatty having brought his Admiral's body safely home was not required to go to sea again but received some land appointment That he was soon promoted to be Physician to the Fleet we know from the title page of his work (Authentic Narrative '), on which he so describes himself and which was published in 1807 Dr Munk[1] says Beatty was appointed Resident Physician to Greenwich Hospital in 1806 but the records of that hospital show that he was not appointed until September 7, 1822, and that he held that appointment until 1830, when he was superannuated[2]

On April 30 1818 he was elected a Fellow of the Royal Society On July 25 1831 he was knighted by King William IV at St James's Palace[3]

Last Years Death, Burial, &c

On leaving Greenwich Hospital in 1810 he went to reside at 43, York Street Portman Square and here he died March 25 1842, the cause of his death being acute bronchitis[4]

He is buried in Kensal Green Cemetery but there is no stone over his grave a regrettable incident to which the writer has already called attention[5] nor can his place of sepulture now be identified

He died unmarried and intestate, letters for the administration of his property, which was valued at £3 000, being granted to his brother Vincent Beatty (as next of kin) who was, at that time, Colonial Commandant of Marines at Plymouth

Obituary notices of a highly laudable character appeared in the ensuing numbers of Dodsley's *Annual Register* and the *Gentleman's Magazine* but the *Times* not only published no obituary notice, but did not even contain the usual paid for advertisement

[illegible] William Munk M D F S A R II of the Royal College of Physicians Vol III [illegible] kindly supplied by Mr C H R Stanshall (B , Director of [illegible] Hospital ( )

[illegible] Society at that time was not what it is now a body of purely scientific [illegible] sort of social club to which all gentlemen of distinction were [illegible]

[illegible] Knights of England

[illegible] certificate which also states that Sir William's housekeeper at York Street [illegible] Mrs Jane Jones who gave information of the death The name of the [illegible] attendance is not stated

( ) Pingdole S D *Brit Med Journ* February 27 1915

Clinical and Practical Notes.

SOME SURGICAL CASES AT THE ROYAL NAVAL HOSPITAL, PLYMOUTH

By Temporary Surgeon (Temporal) RAYMOND JOHNSON F.R.C.S. R.N. and Deputy Surgeon General GEORGE A. DREAPER R.N.

The following cases although not illustrative of war surgery, seem to us to be deserving of record —

Traumatic Initial Peritoneal Hæmorrhage

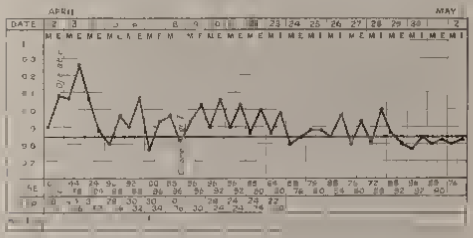
F. R. a marine aged 19, ran down a steep hill on April 10 and being unable to stop himself came violently into a wall at the bottom. In putting out both hands against the wall he flexed elbows were driven against his abdomen. He was winded and after lying on the ground for half an hour was carried home. The same evening he was admitted to the Royal Marine Infirmary, where pain in the right shoulder was the chief symptom which attracted notice.

On the following day (April 11) there was some abdominal pain but nothing suggestive of serious injury. On the morning of April 12 however, the patient's condition was worse and at noon he was sent to the Royal Naval Hospital. On admission, the face was flushed and alæ nasi working, tongue furred and tending to dry, temperature 99 F., pulse 104, respiration 48. There was slight general abdominal distension, muscular rigidity and tenderness were also general; the fulness and tenderness appeared to be slightly more marked in the right lower segment than elsewhere; there was no cutaneous hyperæsthesia; the liver dulness was normal and there was no dulness in the flanks. There had been no vomiting and the bowels had acted shortly before admission.

The question which first presented itself was whether the case was one of peritonitis or of some pulmonary affection, perhaps pneumonia. The patient's appearance, the pulse respiration ratio, and the absence of vomiting suggested the latter but the temperature of 99·2 was much more compatible with some form of peritonitis.

Careful examination of the lungs proved negative and operation was advised on the ground that peritonitis was present. It seemed indeed, quite possible in spite of the history, that the case was one of appendicitis and it was borne in mind that occasionally a traumatism appears to be a determining factor in the onset of an attack. A small muscle-splitting incision was therefore made in the right iliac region, and on opening the peritoneum dark fluid blood escaped in considerable quantity. There was no peritonitis and the appendix was normal. A free median incision was then made and large quantities of blood evacuated, more from the right side than the left. No clots were present and a thorough investigation failed to show the source of the bleeding. Saline solution was therefore introduced and the abdomen closed. With the exception of a troublesome cough and very profuse sweating during the first few days after the operation the patient's convalescence was uninterrupted. The temperature chart is shown in the chart.

[illegible] the symptoms and [illegible] peritoneal haemorrhage, [illegible] Although the amount [illegible] that none of the signs [illegible] It must also be noted that although in many [illegible] one of diffusing peritonitis there was a complete absence of [illegible] whilst the normal action of the bowels was [illegible] hardly to be expected if the intestines had been paralysed by [illegible] The source of the bleeding is merely a matter for speculation possibly it was a small rupture on the posterior part of the liver which could not be thoroughly explored



BULLET WOUND OF INTESTINE ENTEROTOMY

On January 25 at 8 30 p m A F aged 33 was cleaning a Webley [illegible] revolver and X who was standing about 4 ft in front and to the left of him was loading the same X's revolver which proved to be loaded was accidentally discharged the bullet striking A F above the [illegible] He felt a sensation as if something hot was going through his abdomen and a pain shot down his right leg He went down on his knees but was able to get up and walk to the sick bay

On admission to the Royal Naval Hospital at 9 p m the patient's general condition was good pulse 74 abdomen soft and not distended, [illegible] was only present a small entry of bullet in the left pubic region [illegible] the inner third of Poupart's ligament a catheter was passed [illegible] urine withdrawn Screen examination showed the bullet to be lying in the region of the right hip joint It thus appeared almost certain that the bullet had traversed the abdominal cavity and at 7 30 p m it was noted that there was slight rigidity of the lower part of the abdominal cavity and a slight increase in the pulse rate Operation was therefore performed and on opening the abdomen below the umbilicus a little blood escaped The intestine was examined and two small openings close together found in the ileum the edges of the openings being formed by the everted mucous membrane The damaged portion of intestine was excised the ends closed by a double row of sutures and

[illegible] by a lateral anastomosis. A small pantoneal [illegible] of the bowel was over-sutured and a small torn [illegible] removed. The sutura material was [illegible] The track of the bullet in the abdominal [illegible] with pure carbolic acid and the incision sutured in [illegible] trouble after the operation was a considerable amount [illegible] distension which was relieved after an action of the bowels following a dose of calomel given on the fifth day. There was some superficial suppuration in the incision on the sixth day and several buried thread sutures were subsequently removed.

The retention of the bullet caused at first a considerable amount of pain in the right hip and a sarcoscopic indigram taken by Surgeon S. Bradbury on February 20 showed that the bullet was lying in the hip joint between the upper surface of the head of the femur and the acetabulum. As it seemed obvious that its removal could only be effected by a severe operation, involving a temporary dislocation of the joint this was not thought advisable and when the patient was discharged on April 13 the power of locomotion was steadily improving. A month later there was very little lameness and the patient could stoop until the hip was flexed to a right angle.

Calculous Hydronephrosis simulating Rupture of the Kidney

P. C., aged 17, boy, H.M.S. *Neptune*, was boxing on April 7. Ten minutes after stopping he complained of severe pain in the left loin and vomited. When seen in the sick bay at 4 p.m., the temperature was 99°, and pulse 84; there was tenderness with muscular rigidity in the left lumbar region, a short time previously a few ounces of bloody urine had been passed.

After admission to the hospital ship "Garth Castle" the amount of urine was normal but blood was present for six days. A considerable elastic swelling in the left loin regarded as a hæmatoma gradually diminished in size and the temperature, which at first was elevated, fell to normal. Pain at first was so severe as to necessitate repeated doses of morphia.

On admission to the Royal Naval Hospital Plymouth on April 21 the boy's general condition was normal; there was distinct fullness in the left loin where an ill-defined elastic swelling could be felt. During the first fifteen hours after admission forty-eight ounces of urine were passed and the elastic swelling in the loin could no longer be felt; only the lower pole of the kidney being palpable. The urine had a dark smoky colour and contained blood and pus cells.

Two inquiries were now elicited: first, that contrary to the statement sent to the record of the case, there had not been a blow on the side whilst boxing and secondly that at the age of 13 there had been an attack of hæmaturia with pain in the left loin.

An X-ray examination on May 1 showed a dense, rounded shadow opposite the left eleventh rib and the interspace below it, and at a distance of 3 in. from the vertebræ. It was evident that if the shadow was that of a renal calculus it must be lying in the extreme upper end of the kidney, and it seemed advisable to make another examination

after injecting the renal pelvis with collargol With this object a cystoscopic examination was made The orifice of the right ureter looked normal and jets of clear urine escaped from it In the position of the left ureter a small, bladder like projection from the bladder wall periodically appeared and subsided On its surface was a small depression apparently the orifice of the ureter, but all attempts to introduce an ureteral catheter failed The appearance suggested the existence of a stricture of the ureteral orifice with rhythmical dilatation of the ureter behind the obstruction

On May 10 the usual lumbar operation was performed and a large collapsed hydronephrotic kidney exposed, the calculus lying in the highest part of the secular dilatation Nephrectomy was performed, but on account of the dense adhesion of the upper pole of the kidney a small piece of the wall of the highest saccule was left The kidney after removal measured 7½ in in length, the hydronephrosis being the result of distension of the renal substance rather than of the pelvis The stone weighed 9 7 gm , it was nearly black in colour, coarsely lobulated and composed chiefly of oxalate of calcium There is nothing of interest to note during the patient's convalescence, except that the urine rapidly became normal in amount and character

The chief interest of the case concerns the diagnosis which was dependent upon an accurate history and an X ray examination It was at first thought, the condition had resulted from injury the swelling in the loin might have been caused by a traumatic hydronephrosis or by an extravasation of urine into the perirenal tissue The sudden passage of a large quantity of urine coincident with the disappearance of the swelling showed almost conclusively that the latter was a hydronephrosis It is difficult to suppose that the hydronephrosis was entirely caused by a single calculus lodged in the upper pole of the kidney and the appearance of the lower end of the ureter above described raises the question whether an obstruction in this situation may not have followed the damage caused by the previous lodgment of a small stone

CARCINOMA OF SIGMOID COLON IN A MAN AGED 18 YEARS 10 MONTHS

C W signalman reported himself on the morning of January 28 on account of abdominal pain of two or three days duration There was no history of previous abdominal symptoms the bowels had been habitually regular and there had been no diarrhœa or passage of blood The bowels had acted last on January 25, and aperients had been subsequently taken without result The case was at first regarded as one of constipation and [illegible] and was treated accordingly without relief

On January 31 the patient was transferred to the hospital ship "Clunes" On February 4 operation was performed and "an acutely inflamed appendix removed On February 8, no relief having been obtained to the symptoms the abdomen was again opened in the middle line and an annular stricture of the sigmoid colon, apparently carcinomatous was found The loop of gut including the stricture, was brought out through a separate incision in the left iliac region and the bowel incised

On admission to the Royal Naval Hospital, Plymouth on February 15,

the patient's general condition was satisfactory, and the artificial anus in the sigmoid colon acted well

On March 2 the colostomy was completed by the removal of the loop of bowel which had been brought outside the abdominal wall On laying open the excised bowel it presented a tight ulcerated annular stricture 1½ in length the base of the ulcer being formed by opaque white growth extending into the muscular coat A microscopic examination by Fleet Surgeon H C Whiteside showed the typical structure of columnar cell carcinoma

On May 1 a further operation was undertaken with the object of restoring the continuity of the colon and closing the artificial anus As the first step a curved incision was made through the abdominal wall on the mesial side of the artificial anus in order to determine whether there were any signs of recurrence The result being satisfactory a similar incision was made externally and the artificial anus with an elliptical strip of the skin and deeper tissues completely isolated and drawn out with the upper and lower portions of the gut The latter were then clamped and divided, thus removing the parts involved in the colostomy, and the upper and lower segments were united end to end by a double row of fine thread sutures The wound in the abdominal wall was closed except at the centre where a tube and gauze plug were inserted At the time of writing May 16 free natural motions of the bowel are obtained, and a slight leakage from the wound has nearly ceased

This case is recorded simply on the ground of the age of the patient It is at least remarkable that a youth under nineteen years of age should be able to carry out his duties on active naval service apparently free from symptoms, until suddenly attacked with almost complete obstruction resulting from a carcinoma of the colon We do not know the earliest age at which carcinoma of the sigmoid colon has been recorded but in the rectum the disease, although extremely rare in young adults has in many instances been met with below twenty In one recorded instance the patient was a boy of ten years and the disease had caused secondary growths in the lymphatic glands, liver and mediastinum

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NOTES ON SOME WOUNDED TREATED ON BOARD THE 'SAPPHIRE'

By Staff Surgeon THOMAS W MYLES M D F R C S R N

Seventy two wounded soldiers were treated on board this ship, on Monday April 26 They consisted of officers and men from the King's Own Scottish Borderers South Wales Borderers and Royal Marines and were brought off in the ship's boats under my own supervision A rapid inspection of the cases was made and the worst were dealt with at first, as there was no chance of getting them away to a hospital ship for some considerable time and consequently valuable time would have been lost The wounds were severe shock and hæmorrhage were marked The majority occurred in the arm leg and hand and remarkably so in the left upper limb which holds the rifle and is much exposed

A military officer was brought on board this ship by a surgeon from an

the 'Goliath He had tried to transport this patient to the hospital ship but owing to shell fire he was unable to proceed, and as we were the nearest ship he brought him on board as he required immediate attention The officer had a small bullet wound 2 in above the symphysis pubis, with a very large and irregular point of exit in left gluteal region Chloroform was administered by Surgeon Evans and with the assistance of the surgeon of the 'Goliath an incision was made through the right rectus muscle when the peritoneal cavity was opened, the wound being enlarged upwards and downwards so as to get free access to the abdomen On exploring it was found that the lower 2 ft of the ilium were perforated in five different places intestine empty mucous membrane everted Each hole admitted the tip of the little finger and at least 4 in of the mesentery was detached from the intestine, necessitating a considerable resection of the gut The bladder was practically torn to pieces and the general condition of the patient bad Under such conditions the patient being beyond the aid of surgical interference was sent back to bed kept under the influence of morphia and discharged at 6 p m to the "Amethyst for passage to a hospital ship

A private came under my treatment in the same way as the previous case He had received a small bullet wound 1 in above and to the right of the symphysis pubis passing in an oblique direction to a point of exit in the right buttock and producing a very large irregular wound admitting easily four fingers Chloroform was administered as before and on passing a probe it struck me that the wound of the bladder was extra peritoneal With the assistance of the surgeon of the 'Goliath an incision was made through the right rectus and gradually deepened as the wound of the bladder was found to be extra-peritoneal a drainage tube was inserted and the wound partially closed the tissues having been previously washed with saline solution In both these cases blood was demonstrated in the bladder by the passage of a catheter The wound of exit was then examined, and it was found that the bullet had passed in front and to the right of the rectum chipping off a piece of the tuberosity of the ischium The wound was painted over with iodine and brought together with deep sutures, after all hæmorrhage had been arrested and a gauze drain inserted morphia $\frac{1}{4}$ gr given

A private was hit in the right wrist by a bullet producing a compound comminuted fracture of the lower ends of radius and ulna and carpal bones necessitating amputation through the middle of forearm this was carried out by a large anterior and short posterior flaps This man also sustained a slight graze of his right ear and shoulder, caused also by a bullet and was treated with a picric acid dressing

An officer sustained a shrapnel wound of the left axilla. The only nerve trunks left were the ulnar nerve and the lesser internal cutaneous The humerus was intact, hæmorrhage was severe the axillary vein was torn but the artery was intact Saline and brandy were given, and when the patient had sufficiently rallied a general anæsthetic was administered and the axillary vein ligatured Nerve suture could not be attempted owing to the great loss of nerve tissue On arrival on board the limb was blanched and cold but on discharge a faint radial pulse was perceptible, and warmth had returned however, I fear that this

case will require amputation through the shoulder at some later date His condition was excellent at 6 p.m., on discharge, considering the loss of blood and shock

A private sustained a compound comminuted fracture of the fourth metacarpal bone of the left hand, and as hæmorrhage was still progressing an anæsthetic was administered and the wound explored The vessels were ligatured and amputation of the fourth finger was performed through the fourth metacarpal bone, iodine dressing and gauze drain inserted

A private received a shrapnel wound in the upper part of the left thigh, dividing the sartorius muscle First aid had been applied but as hæmorrhage was still considerable a general anæsthetic was given Samway's tourniquet was applied and the wound enlarged The femoral vein being partially torn, a lateral ligature was applied. The pubic arch was chipped and on exploring the wound two portions of shrapnel bullets were removed

A private received a bullet wound in the right shoulder not involving the joint making a small point of entrance The missile passed through the posterior border of the right trapezius muscle and across the spine of the right scapula splintering it slightly The wound was 7 in long, the exit being very large and irregular, and there was laceration of the scapular muscles A general anæsthetic having been administered, the wound was thoroughly cleansed the muscles were brought together by deep catgut sutures the skin by horsehair sutures and a gauze drain was inserted

A private received a wound in the left forearm the bullet passing between the bones As there had been a good deal of hæmorrhage and the first aid appliances had been applied so tight as to blanch the limb, it was decided to explore A general anæsthetic was given hæmorrhage arrested, and wound thoroughly cleansed Sensation was good

A private received a shrapnel wound in the upper part of left forearm, fracturing the ulna The wound was explored and cleansed, the fracture set, and the limb placed on a splint A piece of shrapnel was also removed from this wound.

On May 7, 1915, our boats brought off the following cases which were treated on board

A private was hit on the right patella by a bullet which passed obliquely upwards and to the right emerging on the outer side about the juncture of middle and lower thirds of the femur The knee joint was completely disorganized, the femur extensively comminuted, and the muscles terribly lacerated. The femoral vessels were torn across Shock and hæmorrhage were pronounced. A tourniquet had been applied, but evidently a good deal of oozing was taking place from the bone Morphia ¼ gr was given and the patient was placed under a light anæsthesia by Surgeon Evans The left median basilic vein was opened and 2½ pints of normal saline at a temperature of 110° F were given with excellent results After considering the grave problem involved in the treatment, it was decided to carry out a rapid amputation through the middle of the thigh by a long anterior and a short posterior flap, blocking the nerves by Crile's method This operation was carried out successfully A slight bullet wound through the fleshy part of the right arm was also dressed and the patient sent back to bed with the

end well [illegible] and with hot water bottles [illegible] Pulse small [illegible] low Salines [illegible] pint and brandy [illegible] administered [illegible] at temperature 110° F, was given per rectum at 9 p.m. and 2 a.m. At midnight the patient's condition was as good as could be expected and I had some hopes of a successful result At 6.30 a.m. unfortunately he had an attack of cardiac failure which proved fatal having survived the operation by nine hours

A sergeant was hit in the lower part of the right thigh by a clean bullet Point of entrance was behind the knee joint passing downwards and forwards, exit being about 4 in. above the joint There were all the characteristics of a femur fractured in the lower third, viz. shortening and eversion and evidently the fracture was oblique with very little comminution An anæsthetic was given, and the wound thoroughly cleansed deformity reduced, and a long splint applied This case was sent to a hospital ship next morning He had also a bullet wound through the soft part of the right thenar eminence

A private had a bullet wound passing through the outer part of the right foot, close to base of fifth metatarsal bone There was no fracture The wound was thoroughly cleansed and dressed He was also discharged to a hospital ship

During the operations on the Gallipoli Peninsula the Turks used the nickel jacketed Mauser bullet weight 151 gr, length 1 in and also 0·45 Maxims and 1 in Nordenfelts which inflicted particularly severe wounds Injuries produced by the small calibre bullets maintained an aseptic condition if uncomplicated while shrapnel and shell wounds without exception became infected and suppurated The conditions of the wounds varied considerably the effects produced on the tissues depending upon the velocity with which the bullet impinged its size and the resistance encountered, the energy expended being directly proportional to the velocity with which it struck If the resistance encountered was slight, as in the soft tissues the damage was slight while the greater the velocity and resistance, the more pronounced was the shock and damage to the surrounding parts The explosive effect was most marked at close ranges and best seen in head injuries and in those of hollow viscera The feeling described by the men on being hit was that of being struck by a heavy hammer followed by a dull aching pain Instances occurred where our troops were hit by expanding bullets the general opinion being that either the bullet was reversed in its cylinder or that its point was filed down

Treatment.—It was quite obvious, from the general condition of the wounded that to expect any less results active antiseptic measures must be adopted These men had been forty eight hours without sleep, fighting hard in heavy marching order besides having to carry three days' provisions and extra ammunition Consequently not only were they exhausted and their vitality lowered, but their wounds in most cases were extensively soiled with earth, and from contact with their dirty clothes

On arrival on board, hot bovril tea, coffee and other medical comforts were issued and morphia given when required When the cases came alongside they were hoisted up in a cot carrier and placed under an awning The captain's cabin made an excellent operating room having

good light and [illegible] obtaining a minimum of furniture Towels were [illegible] then removed and then wrung [illegible] thrown out dry In nearly all cases [illegible] anæsthetic was administered and in cases of injury to the [illegible] this was done previously to moving the patient to the [illegible] table The clothes having been removed the surrounding parts were shaved lathered with soap warm water and a nail brush and shaved The wound was then thoroughly washed out with lotio carbolic 1 in 20, followed by sterile water, finally dehydrated with spirit and painted over with iodine Rough usage of the tissues was avoided as much as possible soiled edges of the wound and tags of tissue being removed by the scissors Drainage was employed in all cases and each received a prophylactic dose of anti tetanic serum and anti sepsis vaccine before leaving the table They were then placed behind a screen and when consciousness returned were removed to the upper deck beneath an awning where bovril, soup &c were given to them Three cases of abdominal wounds came under my notice but in all cases peritonitis was well established and the patients were moribund Morphia was given freely and every comfort to ease their sufferings During this period the ship was continually in action, supporting the left flank of the army

In all cases this treatment was thoroughly carried out in the field iodine being applied to the wounds and in most cases hæmorrhage was effectively controlled In some instances the tendency was to apply the tourniquet too tight and in these the limb was blanched and the patient suffered considerable pain

Orders were received to send wounded to a transport for passage to hospital They left us at 6 p m after having been ten hours on board, and when they were discharged their general condition was very satisfactory and their *moral* splendid

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A CASE OF CAISSON DISEASE

By Surgeon General DONALD T HOSKYN M B R N

The following case of caisson disease compiled from notes by Staff Surgeon L Hunt and Surgeon E Moxon Browne is of interest, for though on admission to hospital the patient appeared to be suffering from serious damage to his central nervous system of such gravity that he was thought to be moribund he made a complete recovery with little more than symptomatic treatment

The patient a chargeman of shipwrights, aged 39 of heavy build who had the appearance characteristic of a fondness for good living, on October 7, 1914 was employed in attempting to find and recover a 6 pounder gun which had been lost overboard from a destroyer near one of the outlying islands west of Hong Kong Staff Surgeon L Hunt, responding to a telephone call received at 7 p m proceeded to the destroyer and, on arrival two hours later learned that the patient had commenced diving at about 1 p m and finished at 5 5 p m during which period he had gone down twice, on the first occasion for one hour forty minutes, and after a short interval for three-quarters of an hour These times were only approximate as they had not been checked in any way

but he came direct to the surface after each immersion without any pause in the ascent The depths were given as about 9½ to 11 fathoms On coming to the surface at 5 5 p m, he seemed to be all right and undressed but about half an hour later complained of abdominal pains and commenced coughing He then rapidly became hunt and as soon as possible he was dressed and sent down again Before this was accomplished he was quite unconscious He was lowered to 9½ fathoms, and after being kept there for half an hour was gradually raised to the surface the total immersion lasting for about one hour When at the surface the face piece was removed but he was "not properly conscious" and was therefore sent down again to 9 fathoms kept at that depth for one hour and then brought up, with long pauses at every 10 ft During this immersion he answered the telephone and on return to the surface was conscious and had lost all pain

When Staff Surgeon Hunt first saw him he was on a camp bed on the upper deck and several persons were applying friction to his limbs He was pale, the mucous membranes were slightly cyanosed, the extremities were cold, and the pulse at the wrist very feeble, about 100 It was considered that the time of re compression had been insufficient but as he had improved considerably a hypodermic injection of strychnine and digitalin was given and he was surrounded with hot water bottles and covered with blankets He soon improved, but it was noticed that he gradually became very irritable answering questions abruptly and eventually presented the characteristic appearance of a patient suffering from cerebral irritation He had full use of all his limbs, but would not grasp with his hands During the return of the destroyer to harbour, all signs of collapse disappeared and the patient became very restless and kicked about violently His replies to questions became slower and later his speech was noticed to be thick

On return to Hong Kong, Staff Surgeon Hunt asked Surgeon Duck of the R F A "Delta" to meet him in consultation and it was decided to recompress the patient He was therefore sent down 40 ft and kept at this depth for fifty minutes, during which he reported himself as "all right" but another diver who had gone down with him reported that he was very bad At the end of this period he was slowly raised 10 ft, when he again reported himself by telephone as "better," and "all right" He was kept at this depth for ten minutes and then raised 10 ft and kept twenty minutes, then raised another 10 ft., where he was kept for ten minutes, and then brought to the surface At first he seemed somewhat collapsed and slightly cyanosed and though there was an early improvement, he gradually became semi conscious Soon after 3 15 a m, restlessness again commenced and at 5 30 he could be kept in bed only with great difficulty A hypodermic injection of morphia gr ¼ and atropine gr 1 in 50 had no effect He was brought to the Royal Naval Hospital at 7 a m, struggling so violently that he had to be secured to keep him in the cot

On admission to hospital it was noticed that the patient was very restless moving his head rapidly and violently from side to side His right lower limb and right forearm were also in incessant motion. pulse rapid, unountable and very irregular temperature 101° F The patellar reflexes could not be obtained on the left side because of rigidity and on the right owing to the movements nor could the action of light on the

pupils be observed Babinsky's sign was negative on the left side The patient's attention could not be roused by shouting into his ear and he seemed to be insensible to pain It was impossible to give anything by the mouth, and he appeared to be dying His head was shaved, an ice bag was applied to his head and mustard leaves to his calves

At 10 a m the general condition remained the same It was then noticed that Babinsky's sign was positive on the left side there was analgesia in the left upper and lower limbs and signs of commencing left facial paralysis At 4 p m the pulse was markedly stronger and he seemed to hear when his name was shouted into his ear, but otherwise his condition was unaltered At 6 p m the pulse was still better, 124, temperature 100 4° F but the restless movements continued

It was proposed to use a catheter at 9 p m, but at about 8·30 the urine was passed involuntarily The movements were then not so violent, With some trouble he was induced to swallow calomel gr iv, and a few ounces of milk

During the night the movements gradually ceased and the patient slept for about three hours While asleep he again passed urine involuntarily On the following morning his temperature was 98° F and pulse 92, the patient was lying quietly in bed with eyes closed, but recognized his name and understood and answered simple questions very slowly he opened his mouth when told to do so, had power over the left lower but was apparently unable to move the left upper limb He was ordered milk 2 oz every two hours and mag sulph, sod sulph aa 3i, aqua chlorof ℥ i t d s The improvement continued during the day, and that evening he passed urine voluntarily On October 8 he was able to speak naturally and complained only of being tired He seemed to have almost complete power over the left upper limb, but the hand grip was weak. From this date he improved in every respect and was discharged to his home on October 16, the only sign of his recent illness being slight weakness of his left hand.

He was forbidden to dive for at least six months On May 6, 1915, after examination, he was again passed as fit for this duty

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MEDICAL GUARD

By Fleet-Surgeon W J COLBORNE, R N

The medical guard is a concession allowed by the Admiralty at the discretion of the senior naval officer of the fleet or squadron and is not included in the King's Regulations As very few instructions are laid down in local port orders, &c, with reference to this guard I state below some details and what is the custom of the Service with regard to it:

(1) The medical guard is detailed each day, in some cases for the week, by the senior naval officer's ship of the squadron present The medical officer of this ship is sometimes consulted but not necessarily so, because, for convenience of boats, &c, the medical guard is generally given to the ship having the general guard duties

(2) The ship having the medical guard flies a distinctive flag, and that ship must have a medical officer on board available at all times for

rally to other ships of the squadron this squadron generally consists of four ships if a seagoing squadron In a dockyard or home port the medical guard is generally detailed for a certain group of ships, or even a district

(3) The medical officer of the guard must answer all calls, whether they are to his own squadron or not

(4) The medical guard is taken for twenty four hours, generally from 9 a m to 9 a m

(5) Ships coaling should not be given the guard if it can be avoided, if it is so given and two medical officers are borne, both must remain on board until the coaling is finished

(6) Ships should take the medical guard in rotation regardless of the number of medical officers borne, *i e* with two ships present, one with one medical officer, and the other with two the ships take the guard day and day about

(7) The guard is kept by the junior medical officer of the ship unless the senior medical officer wishes to do so by mutual arrangement with his junior

(8) It is inadvisable to change the ship to which the medical guard has been given if it can be avoided after the signal has been made, as it upsets the rotation and interferes with the arrangements of the other medical officers of the squadron If a change is really necessary it is better to ask another medical officer to take the guard for that day in addition to his own for that week and so avoid alteration of the rotation

(9) Ships having this guard should have two sick berth ratings on board if the number borne will permit as a rating may be required to take a case to hospital or to take charge of a case in a small ship which has no sick berth rating on board

(10) When called to another ship, care should be taken to write full details of the case in the day book, for the information of the medical officer of that ship on his return

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ALTERATIONS IN THE BRITISH PHARMACOPŒIA 1914

By Fleet Surgeon MONTAGUE H KNAPP R N

The following notes on the most important alterations in the new Pharmacopœia may be of use to readers serving afloat or abroad

The Metric system is now used throughout and the Imperial system of weights and measures altogether omitted except in expressing doses, which are still given in both systems

The unit of mass in the metric system is the gramme, which equals 15 4324 grains, and its subdivisions are the decigram, centigram and milligram

The unit measure of capacity is the millilitre, which for all practical purposes is equivalent to the cubic centimetre and equals 16 9 minims The term ml is officially authorized as an abbreviation for millilitre, its subdivisions being the decimil and centimil

It will be noticed that the official dose has not always been altered to correspond with the alteration in strength

Alterations in Strength

[illegible]	Strength compared with B.P. 1885	[illegible]	[illegible]	[illegible]
	Stronger			
[illegible]	[illegible] times as strong	5 [illegible]		[illegible]
[illegible]	[illegible] as strong	[illegible]	Replaced	[illegible]
		5—15	Single	5
[illegible]	[illegible] stronger	5—1[illegible]	Replaced	No change
		20 30	Single	[illegible]
[illegible]	[illegible] 1 50 more [illegible]	30—60		
Acid [illegible]	[illegible] as strong	10 30		5 [illegible]
Spt [illegible]		20 60		5 20
Syrup [illegible]	[illegible] per cent	30—120		No change
	Weaker			
Acid [illegible]	[illegible]	[illegible]		No change
[illegible]	[illegible]	[illegible]—2		
[illegible]	[illegible]	5 20		
Inject [illegible]	Half	—5		[illegible]
[illegible]	Half	5		[illegible]
Liq [illegible]	[illegible]	11 60		No change
[illegible]	[illegible]	10 30		
Pil phosph[illegible]	Half	1		[illegible]
Tabellæ [illegible]	[illegible]	[illegible]		No change
Tinct bella[illegible]	[illegible]	5—15 [illegible]		
[illegible]	Half	1		[illegible]
[illegible]	[illegible] per cent	5 1[illegible]		[illegible]
[illegible]	[illegible]	1		
[illegible]	[illegible]	1 10		
Trochi [illegible]	[illegible]	1 gr in troch		[illegible] troch
Syrup [illegible]	[illegible] per cent	30—60 mins		No change
Spt ætheris [illegible]	[illegible] strength	20—40		15 60 mins
	[illegible] dose altered	60—90		[illegible] 10

External Applications

Ointments [illegible] in strength	*Alterations*
Ung hyd[illegible]	Now twice as strong
„ [illegible]	Increased in strength by one third
Ointments [illegible] strength	
Ung hydr[illegible]	Now half as strong
„ hydrarg [illegible]	Decreased in strength 58 per cent
„ [illegible]	„ „ 33
„ [illegible] and carb [illegible]	„ „ 25

Tinct iodi fort now replaces liq iodi fort of the 1898 B P with which it is practically identical and it also corresponds to the old linimentum iodi of the 1885 B P

Tinc. iodi mitis is the new name for tinc iodi B P 1898, in which there is no change

Emplastrum belladonnæ is now only half as strong as formerly There are now only two official extracts of belladonna instead of three, viz (1) extract belladonnæ liq made from the root, in this no change has been made, (2) ext belladonnæ siccum made from the dried leaves, replaces ext belladonnæ alcoholicum, made from the root,

and ext belladonnæ viride both these are of the 1898 B P., the latter being the preparation supplied to the Service afloat Ext belladonnæ siccum is also called ext belladonnæ and ext belladonnæ alcoholicum

Amongst the new drugs added are veronal and urotropine now officially recognized and called herbitonum and hexamine respectively, and acidum acetylsalicum the chemical name for aspirin

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ANOTHER SCUTTLE VENTILATOR

By Fleet Surgeon ROBLEY BROWNE R.N.

Sharing the privilege with Fleet-Surgeon Montague Knapp of serving in one of the 'elder men of war' I was much interested in his article in the April number of the Journal on A Scuttle Ventilator

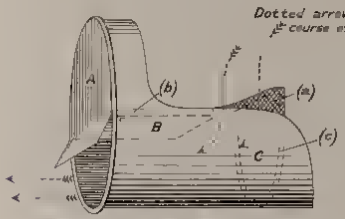


Fig. 1 Sketch showing wind scoop with baffles in place

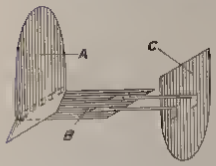


Fig. 2.—Sketch of baffles removed from wind scoop

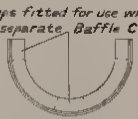


Fig. 3.—Section of wind scoop showing thin angle plate (c) behind baffle C

In this ship ('Hyacinth') the problem has been successfully dealt with by Engineer Commander F J Roskruge, and I think his invention is well worth placing on record, more especially for use on hot weather stations when a maximum amount of air is usually a luxury, and

appreciated as such during winter in the North Sea the same quantity might quite possibly be insultingly termed "no draught!"

Should at any time the supply of air be really considered excessive, the inlet can be graduated by rotating the scoop.

I have been using some of these ventilators in the sick bay here for several months to the satisfaction of the military crews and the great benefit of patients.

DESCRIPTION OF VENTILATOR

The subjoined sketches by Engineer-Commander Roskruge show an arrangement of baffles fitted to enable the ordinary "Service" wind scoop to be used for purposes of ventilation when ships are darkened.

The baffles (made of tin) are three in number, an inner (A) an outer (C), and a central (B), *vide* fig. 1, which shows the wind-scoop with baffles in position. Certain fittings require to be riveted to the standard pattern wind scoop:—

(1) Small side plates (fig. 1, a) to prevent the escape of light at the sides of the outer baffle (C).

(2) Guides (b), of thin angled plate to support the central baffle (B).

(3) A semicircular angled plate (c) about an inch deep, to prevent the escape of light around the outer baffle (C).

All these three baffles can be connected together as shown in fig. 2; they can then be withdrawn bodily to allow the wind scoop to be used in daylight in the ordinary way.

If preferred, the outer baffle (C) need not be attached to the central one; in that case small ships (to hold it in place) must be riveted to the wind scoop, close to plate (c), as shown in fig. 3.

The distance between B and C should be 12 in., the length of B 7 in., and the height of C 10 in., this effectually prevents the escape of any direct rays of light. The interior of wind scoop and baffles should be painted a dull black.

AN IMPROVISED CENTRIFUGAL MACHINE.

By SURGEON A. A. SANDERS, M.B., R.N.

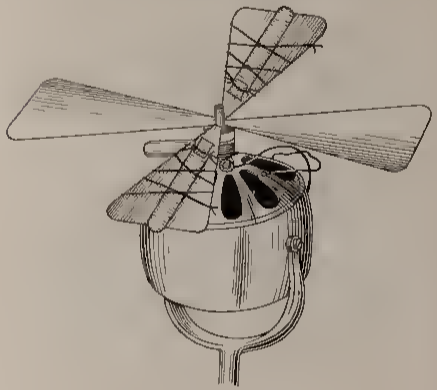
THE absence of a centrifugal machine has often been noticed on board H.M. ships, and as one is not supplied I have frequently used the method described below with satisfactory results.

Take an ordinary electric table fan and place it on a firm table with the blades horizontal or only slightly tilted. Tie on to each of two opposing blades a test tube firmly corked containing some of the fluid to be centrifugalized—taking care first to tie a complete loop round the neck of the test tube just below the everted lip with a firm knot—then complete the fixation as in the diagram.

Let the fan run at a medium speed for half an hour or so, and it will then be found that a firm deposit has been formed. The wedge shape of the blades precludes the possibility of the tubes flying off. After stoppage

of the fan, the deposit will be found to be sufficiently firm to prevent its being disseminated whilst the tube is in a stationary horizontal position pending its removal for examination purposes

Recently, a very small but highly important degree of hæmaturia was discovered by this method, when by other methods it could not be detected



Reviews.

SANITATION IN WAR By Major P S Leileau, F R C S D P H, R A M C- Assistant Professor of Hygiene Royal Army Medical College London J and A Churchill 1915 Pp 267 39 illustrations Price 5s net

This book, which can be comfortably carried in the tunic or jacket pocket, consists of nine admirably concise lectures on that all important subject, 'The Prevention of Disease among Fighting Men in the Field' These lectures were given primarily with the object of assisting civilian practitioners who had left their normal vocation for the unaccustomed and strenuous labours of campaigning, to carry out their new duties armed with that amount of knowledge which is essential, not only to their own peace of mind but also to the welfare and fighting efficiency of the officers and men placed under their care

The first lecture dwells on physical fitness for war, and the unfitness of the recruit is considered from both the physical and psychological aspect The former concerns the medical officer and the latter his combatant colleague only The recruit having passed the examination test, has to be trained to enable him first to march, and next to fight The training must fit muscles, heart respiratory capacity, and excretory organs for the task before them by graduated, varied, and interesting exercises Signs of successful training and indications of excessive strain are described The chief factors in the health of the men actually at the Front are food clothing equipment and comfort The caloric value of field rations has been the subject of experiments to peace by marches under war conditions, and from the result of these the present ration has been evolved The vexed questions of alcohol and tobacco are judicially discussed in this section Methods of determining the quality and condition of tinned rations are described at some length In the section on clothing the fallacy of the red clothing theory is exposed and the value of woollen material in both summer and winter campaigns is well demonstrated Boots, frost bite, and the washing and repair of clothes naturally receive the attention to which such subjects are entitled in a work of this description Equipment is tersely but adequately dealt with, and under this heading of comfort we are shown how cleanliness warmth and suitable mental occupation make for fighting efficiency In the chapter on Anti typhoid Inoculation, the author considers (1) the general principles of active immunization, (2) the application of these principles to the problem of protection, and (3) the scientific and practical results obtained Valuable hints are given here as to the best methods of inducing the men to seek this protection Perhaps the most interesting of these lectures is that entitled 'The March' especially that part of it which deals with practical considerations of food drink clothing care of feet halts and conservancy In the lecture on Sickness in the Army statistics marshalled in a most graphic manner with diagrams and charts clearly demonstrate the success which has attended sanitary efforts during the last century 1855 to 1905 Historic losses from sickness in the wars of the past century and factors determining the

high sickness incidences of war are related in a manner which clothes the subject with great interest, while a study of the methods of investigation, report on, and record of cases of infective disease in the field will repay the reader. The fifth lecture deals with the rôle of insects in war and contains a description of the morphology and habits of the fly as bearing on the problems of fly borne infection. Nine pages are devoted to protective measures against such infection and against vermin.

The sixth lecture covers the whole ground of medical organization and administration in the field. Conservancy in the field is the subject of the seventh lecture, while the last chapter in the book, comprising two lectures, is devoted to water and water supplies. The water requirements of a military force, the best sites for sinking trial borings, the examination of water sources, and the best methods of estimating the yield of water are fully discussed from a practical point of view. The theme of water purification is thoroughly traversed, and the present means of obviating the immense difficulties confronting the sanitarian in the field are explained by means of good illustrative diagrams. Naval officers must at all times be prepared to take the field on shore at very short notice, and we think that in such emergencies this book will be found invaluable, as it affords precisely that kind of information which is not provided in other text books, and which is gathered from an actual experience of practical problems.

R. C. M.

Health in the Camp. By H. R. Kenwood, Temporary Lieutenant-Colonel, R.A.M.C., Professor of Hygiene and Public Health in the University of London. London: H. K. Lewis and Co., 1915. Pp. 58. Price 3d. net, or 100 copies 21s. net.

This little work is a popular treatise on hygiene addressed in simple language to the rank and file. The writer conveys in a most concise form that which every soldier and sailor ought to know. It is true that lectures are given in both Services on elementary hygiene but many men derive greater profit from a perusal of the printed page than from the most eloquent speech, and most men learn nothing until they have both listened to and read words of wisdom. The essence of the teaching of this work is summed up in one sentence: "The obedient and intelligent co-operation of every single soldier is demanded if the sanitation of the camp is to be what it ought to be. Rules, regulations, patrols, and even punishment are of small avail unless the men understand the need for sanitary discipline, and are in sympathy with it." In these few pages the author explains the significance of hygienic rules, and gives many useful hints on how to avoid disease when campaigning. Any medical officer who wishes to vary or enlarge on his hygiene lectures to the men would derive much assistance from this pamphlet. It would be invaluable to surgeons and company officers of the Royal Naval Division. Whatever profits result from publication are to be paid to the Soldiers' and Sailors' Families Association.

R. C. M.

Aids to Surgery. By Joseph Cunning, M.B., B.S., F.R.C.S.Eng. Third Edition. London: Bailliere, Tindall and Cox, 1913. Pp. xii and 230. Price 3s. 6d. net (cloth) 3s. net (paper).

In the third edition of this little book the author has incorporated most of the recent advances in surgery, and has brought it thoroughly

up to date Though intended essentially for students, and one of the Student's Aids Series, it contains a very large amount of compressed information which is set forth with great judgment

The earlier chapters are devoted to general surgical conditions (including infective diseases, tumours and cysts), and then the various regions and structures of the body are taken systematically, the whole being dealt with in as thorough a manner as a book of this character permits

This little work can be strongly recommended, and, if used as its title implies, will be found extremely useful for refreshing the memory and economizing time W L M

MANUAL OF SURGERY By Alexis Thomson F R C S Ed, Professor of Surgery University of Edinburgh, Surgeon Edinburgh Royal Infirmary, and Alexander Miles, F R C S Ed, Surgeon Edinburgh Royal Infirmary Vols I and II Fifth Edition Edinburgh, Glasgow, and London Henry Frowde and Hodder and Stoughton 1915 Vol I, pp 801 Vol II, pp 945 With 590 illustrations Price 10s 6d net (each vol)

It would be needless on our part to enter into a detailed description of this well known and widely read book, it will suffice to allude to the more important of the many developments presented in the present enlarged and revised edition

The whole of the text has been carefully revised, and various sections have been completely re written to bring them into line with recent advances in pathology and treatment By eliminating, as far as possible debatable questions, and such subjects as can only be taught practically in the wards of the hospital, new matter has been incorporated without materially adding to the size

The illustrations throughout are excellent and convey valuable information, the majority being from original drawings or photographs of the authors, many new illustrations have been added which increase the value of the volumes and a considerable number of the woodcuts used in previous editions have been replaced by process blocks

Vol I is devoted to general surgery and vol II to regional surgery—the whole being dealt with in a systematic and thorough manner A distinctive feature in the present issue, and we venture to think an improvement, is the omission from vols I and II of all descriptions of operative procedure we learn from the preface that the authors have compiled a third volume dealing exclusively with operative surgery In a book of this kind one sometimes finds and expects to find, degrees of excellence in different sections in accordance with the author's special learning, to a given area or region where he has done most of his work Here it is difficult or impossible to point out any specialised portion, all is good and up to date Perhaps chapter XIII (vol II) on the abdomen and pelvis is one of the best The surgical anatomy, given at the opening of the chapters in vol II, and of many in vol I, supplies the reader in a concise form with just what he requires to refresh his memory

The already high quality of this work is greatly enhanced in the Fifth Edition, as a manual of surgery for general use, it is unsurpassed at the present day W L M

A Simple Method of Water Analysis By J C Thresh M D D Sc D.P H London J A Churchill Eighth Edition, 1912 Pp 65 Price 2s 6d net

The fact that this little book has reached its eighth edition, indicates that it is widely appreciated The use of colloids for analyses is of great convenience but the results are not always reliable, unless in the hands of an expert and carefully checked The analyst is recommended to bear in mind the advice given in the introduction that the source of the water and the local conditions under which it is stored must be carefully considered before reporting on a water In this edition a chapter has been added on the purification of water by the chlorine process, by means of which a polluted supply may be made fit for use P W B S

Religio Medici Modernus By Neo Kama, M D Lond John Bale Sons and Danielsson London 1915 Pp. 118 Price 2s 6d net

The author gives in a series of essays his own views on religion and the experiences he himself has suffered or enjoyed in a somewhat chequered spiritual career He describes himself as "old and 'rapidly approaching the scrap heap' consequently it may be inferred that he is experienced : his writings at any rate show that he has expended very much more time, energy and thought on philosophic doubt than most intellectual men allow themselves in these days of breathless hurry and busy materialism Apparently in his youth a study of the first principle of modern biology and geology forced on him the conclusion that man had not fallen from a higher state, but had risen from the lowest. Therefore he argued there was no need for the Redemption and hence for him the whole Christian fabric fell to the ground Having purged himself of what he is pleased to call old dogmas he adopted Dalton's theory of atoms as a new irrefutable dogma but when science declared that atoms were resolvable into electrons then the even tenor of his beliefs was upset Even now he only *thinks* he is happily settled in pantheism of a peculiar brand His first essay is on Clergy, who are no better and probably not worse than other men in spite of the temptations of their calling which are strongly provocative of unintentional hypocrisy Next we have a discussion of the Life Hereafter, which is believed in to a limited extent The chapter on Divine Intelligence makes one realize that the author is painfully struggling back to the light through the mists of doubt Spiritualism is dealt with in a masterly fashion, which must gain our admiration The essay on Religion and Sex is instructive and the remarks on Emancipation of Women would make even Mrs Pankhurst pause to wonder whether after all the militants are right or wrong in their methods and aims To medical men the essay on Death is full of interest, and here the author rises to lofty heights of philosophy, yet his theories are cheerless, cold and inhospitable With the sentiments expressed in the short chapters on Ambition and Morality we are in full agreement The book is one to be read on a long voyage and offers unlimited food for post prandial wardroom discussions in peace time, but at present we fear it will nowhere receive the attention to which its literary merit entitles it R C M

Abstracts and Translations.

[illegible] M.) On Certain Antiseptic Substances, containing Chlorine [illegible] for the Treatment of Wounds. Translated from [illegible] *[illegible] l'Académie des Sciences* t 161 p 150, séance du [illegible] 1915.

[illegible] germicidal power of the majority of antiseptics relatively [illegible] reduced as is known when they act in the presence of [illegible] or other matter containing protein. It is probable that the destruction of micro-organisms is due chiefly to a chemical reaction between the antiseptic and the microbian proteins. In research for an antiseptic substance destined for the treatment of infected wounds it seems that the following points are of great importance:—

(a) The use of substances endowed with a germicidal power so high that even when their activity is reduced by the presence of serums or other protein matter they still possess a powerful antiseptic action. In other words to employ substances which after combination with protein matter give compounds remaining actively antiseptic. As an example of a body which by no means fulfils this condition, bichloride of mercury may be mentioned.

(b) It appears that soluble salts not precipitable by protein matter, which can in a certain measure penetrate the tissues and be absorbed by them, are preferable to the substances in which power of penetration and absorption by the tissues is less marked.

(c) The toxicity of an antiseptic and its irritant local action ought to be as feeble as possible in comparison with its bactericidal activity. This condition permits the employment without danger of sufficiently large quantities of the substance. If the germicidal action of an antiseptic substance is the result of a chemical action in which takes part other protein matter than the bacterial protein matter it is very important that the quantity of the substance should be as large as possible.

Among the antiseptics which have already been studied in the treatment of infected wounds, the hypochlorites especially fulfil the conditions which have just been enumerated. But unfortunately the hypochlorites of commerce have a very inconstant composition. Such solutions are irritant. When they are used even with a moderate concentration they can produce less favourable results. It was then useful to discover a means of preparing a hypochlorite of constant composition possessing a great bactericidal activity and a feeble toxic and irritant action on the tissues. This result has been attained by the following method:—

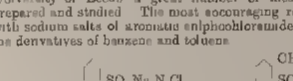
Two hundred grammes [illegible]

[illegible] with a solution of hypochlorite containing 3 grm. per litre). In the preparation [illegible] chloride of lime [illegible] which contains about 25 in 100 of [illegible] But, if the solution is made concentrated [illegible]

A solution thus prepared [illegible] in chloroform in two hours with a concentration of hypochlorite [illegible] while in presence of blood serum the concentration of hypochlorite should in order to produce the same result [illegible] It has been found that this solution is a very useful antiseptic in the treatment of infected wounds, when it is applied after the manner described and used by Dr Carrel

Wounds can be irrigated continuously for several days by means of this solution without marked irritation of the skin The bacteriological examination of secretions from wounds has shown that the solution possesses an energetic antiseptic power Moreover, the solution has the property of dissolving necrosed tissue and also a certain hæmostatic action

It is probable that the action of hypochlorites is due to the chlorine they contain which can replace the hydrogen in the groups (N.H) of proteins, forming substances belonging to the group of chloramines It was interesting to investigate the action of these substances With the co operation of Professor J B Cohen, of the University of Leeds a great number of these derivatives have been prepared and studied The most encouraging results have been obtained with sodium salts of aromatic sulphochloramides and in particular with the derivatives of benzene and toluene



Benzene sodium sulpho chloramide — Paratoluene sodium sulpho chloramide

The substances act on the tissues as powerful, and very slightly toxic antiseptics Their aqueous solutions can be employed in the treatment of wounds with a stronger concentration than the hypochlorites As the chlorine is already tied to nitrogen in these substances they have not the property of dissolving necrosed tissue The paratoluene sodium sulphochloramide at a concentration as low as 1/10000 kills, in two hours *Perfringens* B in suspension in water whereas if the *Perfringens* is in presence of horse serum, the concentration of the substance should be raised to from 1/500 to 1/200 to produce the same result Staphylococci, in suspension in water are killed by a solution from 1/10000 and, in presence of horse serum by a solution at 1/200 The sterilization is complete in two hours

An aqueous solution containing 1 in 400 paratoluene sodium sulphochloramide can be applied to a wound without appreciable irritation

These substances, having a marked hæmolytic power, should not be injected into veins

W L M

SHAW (T B) Staff Surgeon R.N The Early Diagnosis of Syphilis *The Journal of State Medicine*, September 1910 vol xxiii No 9

In the author's opinion the modern methods of diagnosing syphilis in its earliest stages are not yet sufficiently recognized or applied, after an experience of more than three years at the Royal Naval Hospital,

Hudson, two facts above all others remain stamped on his memory (1) The great value of salvarsan or neo salvarsan early in the disease (2) the great importance of an early diagnosis of syphilis Patients are still too frequently sent to hospital with secondary signs already well developed who have had no specific treatment except perhaps, lotio nigra locally

The value of salvarsan and neo salvarsan is directly proportional to the stage of the disease in which they are given, and the earlier treatment is commenced the greater the chances of complete cure

Every sore should be treated with a simple lotion or powder until frequent examinations have been made for the *S pallida* lotio nigra or sol hydrarg perchlor should not be used until the spirochaete has been found or a diagnosis of syphilis made by other means He considers that the Burri indian ink method of demonstrating the spirochaete is the most suitable for use on board ship and recommends the following procedure To obtain the serum the sore should be carefully washed with pledgets of cotton wool soaked in sterilized water, preferably sterilized and as much as possible of the superficial débris removed The object is to get a serum free from débris, blood, or pus so the preliminary washing is of the greatest importance Then direct the patient to squeeze the sore *gently* by means of the thumb and forefinger of each hand (the pressure must be small, else pure blood only is obtained) after a varying time, in some cases not for five or ten minutes sufficient serum exudes with patience it will rarely be necessary to scarify the sore The serum is taken up in a capillary pipette and transferred to a clean glass slide a drop of indian ink is quickly taken up in a platinum loop, mixed with the serum and the mixture is then spread evenly with the aid of the loop or the edge of another slide A frequent source of trouble is the use of too much ink but after a little experience the correct amount is easily judged

An indian ink preparation should be examined for at least thirty minutes before deciding that no spirochaetes are present If negative frequent examinations should be made from day to day

All patients suffering from primary venereal sores, where spirochaetes have not been found, should have samples of their blood tested weekly Also in these negative cases it is well to have a 'Wassermann done two or three months after the sores have disappeared, to exclude definitely the possibility of syphilis

The aim should be to diagnose syphilis early, if possible in the primary stage before the Wassermann reaction is positive W L M

Cottle (G F), Passed Assistant Surgeon, U S N The Damage of Syphilis to the Navy *United States Naval Med Bull*, July 1915 vol ix, No 3

In spite of all efforts towards prevention, syphilis still stands near the top of the list of diseases which cause a large number of sick days in the Navy A reduction in the incidence of syphilis has been brought about by the use of calomel ointment as a preventive, which is efficient though there are inherent difficulties in its universal application Additional measures must be found if the damage to the Service occasioned by this disease is to be reduced

Of a total of [illegible] sick days for syphilis in the Navy [illegible] 56 263 were sick days in the hospital or hospital ship [illegible] Thus in sick days has not been reduced in proportion to [illegible] w discoveries in accuracy of diagnosis and rapidity and certainty of cure

For primary syphilis the committee [illegible] sick days is the necessary average for a patient and believes that except in unusual circumstances, syphilis can be treated on board at the station or yard and that such cases need not be sent to a hospital It is hoped that in time neo-salvarsan or salvarsan will be issued to every ship and station the administration of these drugs is as practicable on board ship at the station or yard as at a hospital Now that the soluble and simply prepared solution of neo salvarsan has appeared the necessity for normal salt solution made with chemically pure sodium chloride and the careful neutralization with potassium hydroxide has gone Only the most simple apparatus is needed a large glass funnel a rubber tube, a needle to enter the vein a medicine glass a glass rod, and a bottle of freshly distilled water are the essentials The distilled water of the ship may be sterilized and then used the only precautions being the silver nitrate test of the water in the evaporator room by the medical officer and the use of this specially tested sample on the day it is obtained

The importance of an early diagnosis is emphasized as a simple method of detecting the *Treponema pallidum* that of C Birt (*Journ R y Army Med Corps*, xxii No 3, March, 1914) is quick easily obtainable, and certain

The author concludes that sick days in hospital for this class of patient should be reduced to a minimum that except in unusual cases syphilis should be treated aboard ship or at the station or yard that the early discovery of the treponema is now practicable that neo salvarsan should be issued to all ships and stations and that these measures if carried out will do much towards reducing the sick days now yearly charged to syphilis W L M

Cambot (P) and Weil-Halle (B) Culture en tubes de sable pour le diagnostic rapide de la Fièvre Typhoïde et le dépistage des porteurs de germes *Comp Rend de l'Acad des Sci*, 1915, vol clxiv p 148

The following method has been found useful in routine laboratory work for the rapid identification of typhoid bacilli from the faeces It depends upon the more active motility of the typhoid germ than that of other intestinal bacteria A U shape tube of 6 m m diameter is made filled with nutrient broth and a small quantity of sterile fine sand is added to one arm this when settled down forms a fine bitter layer above the bend of the tubes The tube is again sterilized, and the other upright is inoculated with a loop of faeces, incubated at 37° C for eighteen hours after that time the inoculated arm above the sand will usually appear turbid and even when clear may show some motile bacilli if the faeces contain typhoid bacilli The organism is further tested by agglutination with specific serum and by culture methods If examination is not made till later *B coli* and other organisms may concentrate through P W B S

Orticoni Procédé d'hémoculture pour le diagnostic et l'identification rapide du bacille d'Eberth et des Bacilles paratyphiques *Comp Rend Soc Biol* May, 1914 vol lxxvii

The author recommends the following method Peptone broth 1 000 c c with glucose 2 0 gr is sterilized for half an hour at 101 C and divided up in flasks of 100 c c When required for use 5 c c of 3 c c of filtered and sterilized ox bile is added In the media with typhoid and paratyphoid organisms grow rapidly the paratyphoid giving rise to the production of gas, which quickly distinguishes typhoid from paratyphoid A and B infections P W B S

Sartory (A) and Lasseur (P)- Le caractère du sérum et l'agglutination du bacille typhique *Comp Rend Soc Biol* 1915, vol lxxviii, p 36

Many reagents are able to cause agglutination of bacteria like that which is produced by specific serums such as formaldehyde perchloride of mercury- sulphate of ammonia lactic acid, watery solutions of some aniline dyes &c As citrate of soda is a frequent addition to samples of blood sent from a distance for laboratory examination the authors have tested specimens, as ordinarily diluted with the solution, for agglutination with *Bacillus typhosus* They found that 5 per cent solution of sodium citrate had no agglutinative power that when added to normal serum it does not cause this to agglutinate the bacillus but that it appears to strengthen the reaction of a feebly agglutinating serum P W B S

Castellani Aldo Note on Paratyphoid Vaccination with Mixed Vaccines, *Centralbl f Bakt* 1914 vol lxxii p 67

For a considerable time Castellani has advocated mixed vaccines in areas where both infections are common He has used several thousand inoculations of both killed and attenuated vaccines without giving rise to more severe reactions than with the ordinary method The immunity produced is good against all the organisms the agglutinative results obtained were similar to those found when the vaccines were given separately He recommends for general use a vaccine killed at 58° C containing 500 million typhoid and 250 million of each paratyphoid in 1 c c the first dose being 6 c c the second 1 2 c c

(N B —For general purposes it is recommended in the Royal Navy to give the two separate immunizing doses of typhoid vaccine and a third inoculation of 500 million each of the paratyphoid organisms and these should if possible be strains from the endemic area)

P W B S

Dyer (A W) The Agglutinative Reaction after Anti typhoid Inoculation *Indian Journ Med Research* April, 1914 vol i No 4

In an examination of 182 men who had been previously inoculated the author draws the following very important conclusion that in a patient inoculated over six months previously a reaction of 1 in 10 (that is 2½ times above the normal limits) indicates that the patient probably has typhoid fever and therefore with a well attested strain, a diagnosis may be made even among the inoculated with a fair degree of certainty

(The following tests carried out at Greenwich are fairly typical Blood

tested daily for a week after first inoculation (B S) gave no agglutination from 1 in 20 upwards After the second inoculation of 1 000 million the agglutinins rapidly rose remained at a high level for a month and then fell markedly as shown in the following table —

MAXIMUM AGGLUTINATION VALUE OF SERUM AFTER SECOND INOCULATION

Day	2	7	10	14	21	30	28	45
Patient	1 in 100	1 in 600	1 in 800	1 in 1000	1 in 750	1 in 1000	1 in 200	1 in 100

After one year no agglutination of B *typhosus* in dilutions higher than 1 to 20 were observed) P W B S

WADE (E M) and McDANIEL (O) Observations on the Widal Reaction following the Administration of Typhoid Vaccine *Amer. Journ. of Public Health* February 1915 No 2

An interesting report is given of the results of anti typhoid inoculations of 1 179 persons in an asylum every one of whom gave a negative Widal reaction before inoculation, three injections were given and the bloods were frequently examined afterwards At the time of the third dose 75 per cent were positive and ten days later 89 per cent Out of the 1 179 people, 770 who had previously given positive reactions when examined six months later gave 68 per cent negative Widals, 8 8 per cent partial reactions and 23 per cent positives, after one year out of 117 persons 11 7 only were positive P W B S

WILUCKI (V) Morioe-Stathearrt Paratyphoid Fever on Board S M S 'Posen' *Archiv für Schiffs und Tropen Hyg*, 1915, vol. xix, No 12

The author reports thirty three cases of paratyphoid B infection occurring on board S M S 'Posen' The outbreak commenced ten days after leaving port *B paratyphosus* B was isolated from the water, this was afterwards rendered absolutely sterile by use of chloride of lime, as steam disinfection of the tanks had proved useless The infecting organism was also found in one sample of brawn used for food and 43 per cent of the cooks were proved to be 'carriers' He states that passage of the organism through a dog increased its virulence The author believes that the water was the chief source of infection but he gives no definite proof Clinically the thirty three cases are divided into five groups of which the most interesting were those having symptoms resembling influenza There were no complications and no relapses. Eight of the cases proved to be carriers H L G

FLEXNER (SIMON) The Mode of Infection and Etiology of Epidemic Poliomyelitis *Amer. Journ Dis Child*, Chicago, 1915 vol ix, pp 353 357

Two views have been put as to the means by which this disease is spread (1) That the stable fly conveys the infection This was suggested in the first place by the seasonal prevalence of the disease, namely at midsummer and in the early autumn, though a few cases

occur in the spring and even in the winter months in the second place by the rural character of some epidemics and by the relatively wide distances which separate many of the cases but here again it must be admitted that epidemics of poliomyelitis occur in towns and that cases may be closely grouped and lastly by some experimental results In 1912 Rosenau announced that he had succeeded in communicating experimental poliomyelitis to monkeys by allowing stable-flies to feed first on monkeys inoculated intra cerebrally with poliomyelitic virus and then on normal monkeys He believed that flies might carry the infection, and that some intervening period of time was necessary during which the virus underwent a developmental change in the insect host This was confirmed by Anderson and Frost but none of the numerous other observers have obtained positive results Anderson and Frost, indeed, failed to confirm their earlier results and no explanation of the successful experiments has so far been given

(3) The alternative view that the infection is conveyed by personal contact is accepted by Flexner In addition to the frankly paralytic and meningitic forms of poliomyelitis there are abortive and ambulatory cases which can be recognized by lymphocytosis of the cerebro spinal fluid by the presence in the blood serum of the immunity bodies found after a frank attack of the disease and absent from normal blood, and by the presence in the nasopharynx of the virus in such quantities as to give rise to poliomyelitis in inoculated monkeys There are also healthy "carriers" who have been in close contact with acute cases of poliomyelitis and chronic "carriers" who have recovered from an acute attack The possibility of the distribution of the virus by the frankly ill the abortive and ambulant cases, and "carriers" renders the personal communication probable Flexner also refers to his discovery two years ago with Noguchi of the filterable minute globular micro organism distinctly visible under high powers of the microscope which he has been shown to be the virus of epidemic poliomyelitis H D R

FLEXNER (SIMON) and AMOSS (H L) The Rapid Production of Anti dysenteric Serum *Journ Exper Med*, N Y 1915 vol xxi, pp 515 534

As a result of the European War the Rockefeller Institute received requests for supplies of anti dysenteric serum which were in excess of the quantity available This rendered it advisable to discover a method of preparing the serum more rapidly, especially as it is doubtful if the serum is manufactured in bulk in any of the belligerent countries Hitherto the serum has been obtained by injecting horses subcutaneously with cultures or with the toxine of dysentery bacilli and it has taken a considerable time—nine to twelve months—to obtain an active anti serum Now by employing the method of successive intravenous inoculations of several varieties of dysentery bacilli, with intervening periods of rest, an effective polyvalent anti dysenteric serum suitable for therapeutic use in human beings can be prepared from the horse in about ten weeks Two distinct groups of bacilli, though indistinguishable morphologically and producing similar intestinal lesions, may cause acute dysentery They are readily differentiated by their power of fermenting certain carbohydrates and by their agglutinative reactions These two

„ronps are [illegible] Shiga bacillus which possesses limited fermentation powers and [illegible]s a soluble toxin and (*b*) the heterogeneous Flexner group of bacilli which possess wider fermentation powers than the Shiga bacillus and do not produce a soluble toxin By injecting horses alternately with living dysentery bacilli belonging to the Shiga and Flexner groups a polyvalent serum of high power can now be obtained

H D R

Noguchi (Hideyo) Pure Cultivation *in vivo* of Vaccine Virus free from Bacteria *Journ Exper Med*, N Y 1915, vol xxi pp 589 570

Up to the present time no method has been perfected by which vaccine virus can be propagated free from contaminating bacteria The virus is propagated by transmission from the skin of one calf to that of another Glycerine is employed as an elective germicide against the non spora bearing bacteria in fresh or green vaccine pulp and after contact with concentrated glycerine in a refrigerator for one to three months the virus becomes ripe for vaccination on human beings and fairly free from bacteria Such ripe vaccine however may contain streptococci, staphylococci, *Bacillus coli* *B subtilis*, and some other aerobic and anaerobic bacteria Glycerine does not exert any action on bacterial spores and a sterile vaccine is never produced by glycerination Noguchi has obtained pure cultures of vaccine virus by inoculation into the testes of rabbits and bulls of vaccine virus freed from associated bacteria by suitable disinfectants such as ether The sterile vaccine is injected into the substance of the testis The multiplication of the virus within the testis is at its maximum on the fourth or fifth day after inoculation and causes acute orchitis the amount of vaccine remains stationary until the eighth day and then diminishes until at the end of five weeks no virus is left The virus can be indefinitely transferred from one animal to another, though several transfers from testis to testis are required to bring about accurate adaptation of the virus to the testicular parenchyma As the transfers proceed the activity of the virus rises until, when adaptation is complete the activity of the testicular strain equals that of the skin strain As many as sixty transfers of a pure strain have been made in a year in rabbits Human beings react to the pure testicular strain of vaccine in an absolutely typical manner This method of cultivation and propagation of a bacteria free vaccine can be carried out with economy and without difficulty, and the strains thus obtained supply an ideal form of virus for human vaccination

H D R

News of the Service.

OFFICERS MENTIONED IN DESPATCHES

Extract from Despatch from Vice-Admiral Sir J. M. de Robeck, reporting the landing of the Army on the Gallipoli Peninsula, April 25-26, 1915:—

Surgeon P. B. Kelly, R.N., attached to R.N.A.S., was wounded in the foot on the morning of April 25 in "River Clyde." He remained in "River Clyde" until the [illegible] during which time he attended 750 wounded men, although in great pain [illegible] unable to walk during the last twenty-four hours.

Commended for service in action: Temporary Surgeon W. [illegible], H.M.S. [illegible]

Extract from the *London Gazette*, August 16, 1915:—

The King has been graciously pleased to give orders for the following appointment to the Distinguished Service Order, and for the award of the Distinguished Service Cross to the undermentioned Officers in recognition of their services as mentioned in the foregoing despatch:—

To be a Companion of the Distinguished Service Order: Surgeon Peter [illegible] Kelly, R.N.

The following awards have been made in recognition of services during the [illegible] of the Dardanelles prior to April 25, [illegible]

The King has been graciously pleased to give orders for the following appointment to the Distinguished Service Order:—

Surgeon Martin Henry [illegible], R.N. During the time H.M.S. [illegible] after being struck by a mine, the [illegible] great [illegible] the ship in possible danger of sinking on passage, Surgeon [illegible] kept up the [illegible] in the fore distributing station [illegible] though partially overcome by the fumes continued his work.

The following Officers were commended for service in action:—

Fleet-Surgeon Edward H. [illegible] Meaden, R.N.

Surgeon John Harding Kaye [illegible], R.N.

Extract from General Sir Ian Hamilton's despatch dated June 12, 1915:—

List of the names of those Officers whom I consider to be deserving of being specially mentioned and recommended to Their Lordships' notice:—

Surgeon F. G. [illegible], R.N., [illegible] Battalion.

September 18, 1915.—The King has been graciously pleased to give orders for the appointment of the following officer to the Distinguished Service Order in recognition of the services mentioned:—

Surgeon Basil Alfred Playne, R.N., Royal Naval Division.

For gallantry and good service during operations near [illegible] April [illegible] [illegible] [illegible] regardless of the [illegible] of the enemy's fire [illegible] on his back from the [illegible] conspicuous bravery and [illegible] to perform his [illegible] great confidence and spirit at all risks. He was again several times brought [illegible] gallant deeds when attending wounded [illegible]

APPOINTMENTS

June.

Surgeon-General Sir James Porter, K.C.B., K.H.P., [illegible] for inspecting [illegible] to the Mediterranean; [illegible] C. R. Maclean, M.D., B.A., to be lent [illegible] Hospital [illegible] and Land Transport during absence of Sir James Porter with headquarters at Chatham.

Fleet-Surgeons: J. H. [illegible] to the "Minotaur"; W. H. S. Stalkartt to R.N. Barracks, Devonport; H. J. Haldane, R.N. (Retired), to R.N. Air Station, Hendon.

H W Stan [illegible] LIEUT. [illegible]
H [illegible] [illegible] Malt
[illegible] Mad [illegible] Hend [illegible] C H
n R N [illegible] J [illegible] Z [illegible] R
[illegible] [illegible] ld to th [illegible] C B G [illegible] M
[illegible] [illegible] ll for h [illegible] Williams [illegible]
[illegible]

[illegible] th Victor [illegible] Jean M B [illegible]
[illegible] M [illegible] R N Hospital [illegible] T C Burgin
[illegible] Arthur [illegible] n to Carlton
[illegible] [illegible] [illegible] the Lancaster [illegible]
[illegible] [illegible] the Victory, added for Disposal [illegible]
[illegible] [illegible] for to th Victory, added for disposal [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] Marsan M B [illegible] R N Barracks Deal
[illegible] M [illegible] Portsmouth added for disposal W [illegible]
th [illegible] [illegible] Yard added for disposal A G V [illegible]
th [illegible] [illegible] Museum to the Manchuria
[illegible] [illegible] M [illegible] to the Victory added for disposal
M Pawl [illegible] Barce [illegible] H H Collett M B to R N Ar
Station [illegible] Haslar Hospital G W Meaney M B [illegible]
Chatham [illegible] [illegible] [illegible] added for disposal W S [illegible]
M P [illegible] [illegible] Hospital ship Rain [illegible] Kennedy to the
Mersey [illegible] R W Townley to the Victory added
for disposal W A [illegible] [illegible] ship Chiron [illegible] Finlay to th
hospital ship [illegible] [illegible] the hospital ship China C W Archer
to Haslar Hospital [illegible] [illegible] Hospital J G Dobson to the
Drake G W [illegible] [illegible] Hospital D S Johnson to the Zebra S N
Wright to [illegible] [illegible] D Martin to Haslar Hospital W H Hayter
Thesens D [illegible] [illegible] N An Staff Wommood Serulis, H H Budd
to Haslar Hospital [illegible] Sargeil to the Carnarvon H [illegible] Smith to the Victory
added for disposal [illegible] Haslar Hospital W Ford to R N An Staff
Felixstowe [illegible] [illegible] to the Victory, added for disposal W Lovell
Haslar Hospital [illegible] Haslar Hospital [illegible] Wyndham to the Yard added
for disposal [illegible] [illegible] R S to the hospital ship Rewa R C Lashm
to the Barham [illegible] Malcolm to the Pelorus J C Gillies to the Blake J F
Walker to the [illegible] [illegible] [illegible] the Gladiator B Lovitt to R N Sick
Quarters Stonehouse [illegible] to the Dolphin W Hoad to the Cetos S R Evans
to the Formidable [illegible] Hospital F J Forgeo to Haslar Hospital C M Burrell
to Haslar Hospital [illegible] [illegible] Hospital Cricket Ground
Surgeon [illegible] R N V R [illegible] s or to the Mastiff T H R
McKeran [illegible] [illegible] C I Stone [illegible] Nos R W Harrod to the Medea
E W Hall to the Minerva [illegible] S Mortimer to the Christopher G B W Jelford
to the Victorious [illegible] [illegible] [illegible] E J Jane to the Medusa P Barlow
to the Porpoise J J Mellor to the Albion G L Durham to the Lord
F Hibbert Andrison [illegible] Engineer W [illegible] to the Hospital yacht Liberty

Jan

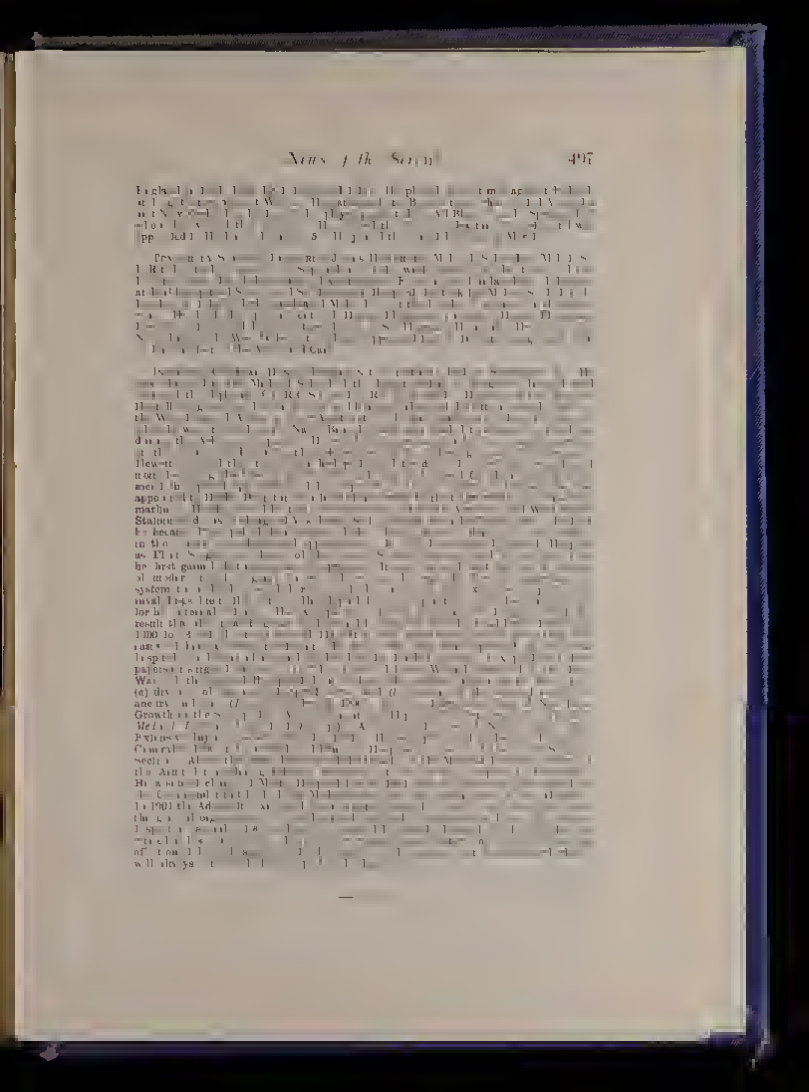
Deputy Surgeon [illegible] [illegible] M [illegible] H M S O to Haslar Hospital
Fleet Surgeon [illegible] W Hall, M A, M B [illegible] Hospital ship Sapphire F F Lil
to the Queen Mary W H Hope to the Berwick S J Rule to the Victory added for
disposal [illegible] [illegible] [illegible] R N (Retired) to the Victory added for Disposal F
W Tarker to R N S & Quarters Brompton H S Burmister, M B to H N
Barracks Chatham P Belcher M B R V to the Warrior, H E Tomlinson to the
Vivid added for disposal N J Rock to the Duncan, S R Pasey to the Implacable
F L [illegible] M B to the Barham, E Sutton to the hospital ship
Karapara [illegible] [illegible] Rolington to the Victory added for disposal P V Jacks to
R N (Retired) to the Yard added for disposal F F Malmon to the Pembroke added
for disposal R [illegible] Hogbogar M D R V, lent to Recruiting Headquarters R C
Ward M D [illegible] Boyd to Victualling Yard F Pallatt to the Vivid added for
disposal J A Campbell to the Portsmouth added for disposal
Staff Surgeon [illegible] L Cross M B to the Victory added for disposal A C W
Newport to the Highflyer A La F Dudley to the Orbita J R A Clark Hall to
the Medicine C F Ashlead to the Victory added for disposal W C B Smith

[illegible]

[illegible]

[illegible]

OBITUARY.



ADMIRALTY ORDERS ISSUED FROM AUGUST 1, 1914, TO AUGUST 1, 1915 [1]

(The more important Orders pertaining directly to the duties of Medical Officers official and not confidential are included only.)

GENERAL

140 (*W O 81*) —Patients suffering from Mental Disease

(N /M It 3501 —1 10 1911)

In order to facilitate the early relief of the Naval Hospitals from patients suffering from mental disease, the Service Certificates are to accompany all patients sent to hospital suffering from mental disease or mental weakness.

195 (*W O 139 and 203*) Ratings discharged to Hospitals or Hospital Ships

(N —2 11 1911)

When ratings are discharged to Hospitals or Hospital Ships from H M Ships application is to be made to the Admiralty as laid down in M O 172 1914 for the money so ordered to be filled as soon as possible. The Depot to which the man discharged belongs is at the same time to be stated.

(a) When the ratings in Hospitals are discharged ordered they are to be sent to their Depots and not to the Ships.

(b) The papers of such ratings are to be transferred direct from their Ships to their Depots.

M O 172/1914

35 (*W O 891 1914*) —Patients discharged from Ships for Treatment

(N M D 14015/14 —1 1 1915)

The attention of Medical Officers is drawn to the necessity of sending a report on Form M 188 on all patients who are discharged from ships whether to other Ships Naval or Military Hospitals or to Civil Establishments.

238 —Information to accompany Blood sent for Wassermann Test

(M It 1626 15 —1 5 1915)

When blood is sent to Hospitals to be tested as to the Wassermann reaction Medical Officers are to forward also the following particulars —

(a) Name of patient.

(b) Whether blood is sent for diagnosis only.

(c) Amount of treatment received by the patient.

(d) Whether patient is under intermittent treatment now If not the date when mercury was discontinued.

(e) Dates and results of any former blood tests.

285 (*W O 166*) —Naval Patients under Treatment in Civil Hospitals for Scarlet Fever

(N —1 6 1915)

When a case of Scarlet Fever is discharged to a Civil Hospital the authorities of the Hospital should be asked not to discharge the man for at least six weeks. Should however this period be impossible the patient must be sent for the completion of the six weeks quarantine to the nearest Naval Infectious Hospital.

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[1] A not to scale copy of reprints or excerpts will be found on p 512. They can be obtained on application to the Publishers.—Ed

345 (*W O 3[illegible]*) **—Dental Treatment of Naval Officers and Men**
(A [illegible] 1916—17 7 1915.)

[illegible] where it is impossible to obtain the services of a Dental Surgeon in a Naval Establishment the Admiralty will allow reasonable expenses incurred in obtaining such treatment [illegible] attendances at temporary stoppings and the provision of artificial teeth. [illegible] In the case of naval ratings may be extended to cover important dental treatment [illegible] as all the cases of extractions provided it is [illegible] that dentures [illegible] [illegible] would be impossible or unsuitable.

It is arrangement [illegible] [illegible] in the period of the war only.

346 (*W O 464*) **Cases of Cerebro-spinal Meningitis—Procedure.**
(A [illegible] 1915—17 7 1916.)

Should a case of cerebro-spinal meningitis occur in any ship the patient is at once to be discharged to Hospital [illegible] [illegible] In addition, all close contacts will be kept sleeping on deck [illegible] the men sitting next to him in messes, and special precautions will be taken to [illegible] to Hospital and examined [illegible]

Apart from this no action will be necessary [illegible] but daily examination by a Medical Officer [illegible] [illegible] should at least once a day be reported on [illegible]

The usual precautions required in the event [illegible] be carefully carried out.

126 (*W O [illegible]*) **Wounded Officers—Particulars.**
(A [illegible] 1914.)

Medical Officers attending [illegible] wounded officers are to send without delay to the Medical Inspector-General [illegible] a report containing the following information:—

(1) The name of the Hospital Ship [illegible]
(2) The date on which the wound [illegible]
(3) The description—giving name of Hospital Ship or Hospital to which sent—of the case in which he [illegible]

139 (*W O 464*) **—Wounded Men Distinguishing Marks for**
(A [illegible] 10 1914.)

Medical Officers on first attending to the wounded should put a distinguishing mark on the clothes [illegible] of the wounded man to show the degree of wound [illegible]

A luggage label (cloth) or a piece of cloth with the undermentioned marks on it [illegible] pencil should be used:—

Label without any mark	Slightly wounded
Label with blue pencil cross	Severely wounded
Label with red pencil cross	Dangerously wounded

These labels should be tied on in a conspicuous place so that on undressing [illegible] Hospital the degree of wound may be considered without any examination or disturbance of the patient.

192 (*W O 800*) **—Casualties during Hostilities—Reporting.**
(N P 1948/14—2 11 1914.)

Care is to be taken that all casualties (including dead, wounded and missing) are reported by telegraph to the Admiralty at the earliest possible moment [illegible] the case of the Destroyer Flotillas Captains (Depart to make arrangements as economically as far as practicable the [illegible] should be telegraphed to the Admiralty [illegible] the Depot Ship of the Flotilla after verification of ratings official numbers &c.

The Admiralty will communicate with the relatives in all cases and the [illegible] next of kin to relatives by the Captain of the ship in order to be made. [illegible] will not in respect to the procedure laid down in Article 578 of the King's Regulations (Volume II., 1913) is to be followed. (In Naval Hospitals and Sick Quarters the ordinary procedure is to be followed until otherwise [illegible]

193 (*W O 3[illegible]*) **—Men Wounded in Action—Hurt Certificates**
(N P —2 11 1914.)

Men wounded in action are to be granted Hurt Certificates [illegible] in the case of men others so injured in the execution of their duties these documents forming the only record that the injuries are attributable to the Service.

The [illegible] 1318 and 1354 of [illegible] practicable, although [illegible] sustained [illegible] [illegible] possible.

236 [illegible] — Water Tanks — Cleaning of

([illegible] 1.5.1915.)

[illegible]

(i) [illegible] all Ships [illegible]

(ii) [illegible] of the men who [illegible] to be present [illegible]

(iii) [illegible] work is to be done by the Ship, not by Contractors.

237 [illegible] — Improvised Accommodation

(M.[illegible] 1424/3777/15. — 1.5.1915.)

[illegible] it becomes necessary to improvise accommodation for officers [illegible] of such accommodation should be inspected and reported on by [illegible]

VENTILATION

146. — Warm Air Supply to Living Spaces in H.M. Ships

([illegible] 186/14. — 11.[illegible] 1914.)

[illegible] having been received from the 1st and [illegible] Battle Squadrons [illegible] Squadron and the [illegible] Light Cruiser Squadron, in reply to [illegible] the supply of warm air to the living spaces in certain of H.M. Ships [illegible] been drawn up for guidance in the management of [illegible] months in cold [illegible]: —

[illegible] of between 55° and 60° should if possible be maintained [illegible]

[illegible] 50° is sufficient [illegible] not often be required.

[illegible] of the new system below [illegible] deck [illegible] position of the air supply [illegible]

[illegible] of the artificially supplied air should be regulated: —

[illegible]

[illegible]

222. — Ventilation — Analysis of Air

(M.[illegible] 7015/[illegible] — [illegible] 1911.)

[illegible] from the Medical [illegible]

91 (*WO 103*)—Ventilation Party

(D 29130/14—1 2 1915)

Attention is called to the necessity of instituting a properly organised ventilation party on board H M Ships under careful supervision and with regular routine for working and examining valves and keeping the system efficient particularly as regards its watertightness

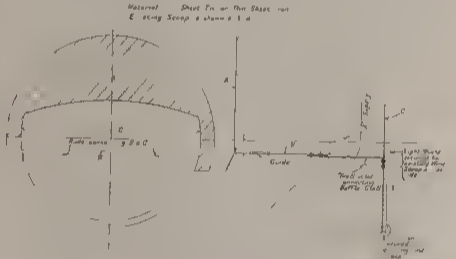
972—Windscoop designed by Engineer-Commander F J Rackrugo R N

(D 6131/15—12 6 1915.)

The following description and sketch showing a proposed arrangement of "Light" baffles to enable the windscoops at present fitted to sidc scuttles during daylight to be used for ventilating purposes when the ship has been darkened at night is promulgated for general information on —

Three Light Baffles A B C are fitted as shown in Sketch and I connected together as drawn may be readily removed from the present Windscoop during daylight or Baffle B may be permanently secured to the Windscoop and the other two Baffles with drawn or complete Windscoops of this design may be constructed for use at night only

(*East Indies 6 4 15, No. 137/415*)



1063—Ventilation Arrangements

(D/N D 5237/15 and D 10402 15—2 7 1915)

In order that the means provided for ventilation may be used to the best advantage the Commanding Officers of H M ships (except Queen Elizabeth") are to report to Harm S 176 the scheme adopted in each case for running the fans This report is to include a statement as to which fans are in use at different periods of the day and night and for how long

The broad outlines of such a scheme should be that as far as possible the fans supplying oil the living spaces and certain specified fans such as those ventilating Heads and W C s are run for about twenty hours out of twenty four and the remainder as required

These fans and natural exhaust and supply trunks which are to be utilized in action are also to be specified

"*Queen Elizabeth Class*

(1) A modified French water excluding top is to be fitted to the ventilation intakes and exhausts of the Check Transmitting Stations

E E

[illegible] the place [illegible] (the letters [illegible]) [illegible]

[illegible] the S[illegible] (Form S 176)

1138 **Ventilation Systems of H M Ships—Alterations to**
(D 11531 [illegible] —23 [illegible] 1915)

[illegible] ventilation systems of H M ships are to carried out with [illegible] approval

STORES

333 Operation Gowns.
(M D 1116/15 —9 9 1915)

[illegible] operation gowns to all ships carrying Medical Officers [illegible] as follows —

[illegible] Battle Cruisers and Cruisers [illegible]

[illegible] other ship bearing a Medical Officer 1

[illegible] be available at the R N Hospitals for issue to H M Ships

482.—Hypodermic Solution of Morphia
(M D [illegible]/15 —26 3 1915)

[illegible] hypodermic solution of morphia has been added to the [illegible] the Service [illegible] Medical Officers are to demand [illegible] in accordance with the following scale —

[illegible] carrying a Medical Officer with a complement of 600 and over 8 oz

[illegible] carrying a Medical Officer with a complement under 600 4 oz

730 —Medical Stores allowed to Destroyers.
(M D 6101/15 —7 6 1915)

[illegible] inch bandages allowed to Destroyers has been increased from 24 to 16 [illegible] Medical Officers of Parent Ships are to draw the extra allowance from [illegible] at their [illegible] port and distribute them to the Destroyers under [illegible] charge

300 —X ray Coils —Preservation
(M D 5769/15 —1 6 1915)

[illegible] to prevent wastage of platinum and destruction of [illegible] of voltage 12—30 when showing signs of being [illegible] spark on platinum points should be sent as soon as possible [illegible] The coil alone should be sent

369 (B O 860) —Boracal Powder
(M D 5709/15 1 5 1915)

[illegible] equal parts of salicylic acid and boracic acid has been added to [illegible] allowed to the Service afloat for use in the prevention of [illegible] powder will be put up in dredger tins each containing approx [illegible] will be known as Boracal Powder

[illegible] as follows —

[illegible] No 1 Medicine Chest 3 tins

[illegible] No 2 Medicine Chest 2 tins

[illegible] No [illegible] Medicine Chest Destroyer Medicine Chest, [illegible] Medicine Chest and Submarine Medicine 1 tin

[illegible] to demand quantities to complete to Scale from their Naval [illegible]

[illegible] for and issue to their Tenders

PERSONNEL

15 (W O 1911) —Surgeon Probationers, R N V R —Leave to Attend Examinations
(C W —1 1 1915)

Surgeon Probationers of the R N V R are to be granted reasonable leave to attend the examinations for promotion to the Admiralty being, if found in each case to be necessary for such leave granted

31 —Sick Berth Ratings—Recommendation for Warrant Rank
(C W —1 8 1914)

Recommendations of Chief Sick Berth Stewards for Warrant rank are to be made out by the Medical Officer of the ship and forwarded through the Commanding Officer

153 (W O 394) —Reserve of Medical Officers Equipment Allowance
(C W 7361 —3 11 1915)

Officers belonging to the Reserve of Medical Officers of Order in Council of August 11 1903, are to be paid the equipment allowance of £20 on being called out for service

159 (W O 514) Surgeons R N V R.—Promotion to Staff Surgeon
(C W —1 4 1915)

Surgeons R N V R will be considered qualified for promotion to the rank of Staff Surgeon R N V R on completing six months' naval service provided that he has attained eight years seniority in that of the rank as which they are required to undergo in time of peace

160 (W O 715) —Surgeon Probationers R N V R —Examination Leave
(C W —1 4 1915)

Leave for Surgeon Probationers to attend examinations is limited to three days. If longer period is required reasonable will be necessary. No extra time can be given during leave.

(W O 15 1915)

172 (W O 320) —R N Auxiliary S B Reserve—Promotion to Senior Reserve Attendant
(N 1750/15 —1 11 1915)

All Junior Reserve Attendants on Active Service at the date of this Order are to be considered eligible for promotion to the rating of Senior Reserve Attendant provided they are in possession of the Ambulance First Aid and Nursing Certificate or hold the Medallion of the St John Ambulance Association and the Nursing Certificate of that body

In addition their record is reported upon as efficient by the Medical Officer under whom they are serving

The names of the Junior ratings considered for promotion are to be forwarded to the Medical Director General for approval prior to advancement by their Commanding Officers

329 (W O 505) —Sick Berth Staff—Examination and Promotion
(N 2104/15 —17 1915)

In the case of men borne on the Sick Berth Staff of ships who are likely to be sitting for final examination for a higher rating one of the following alternatives should be adopted :—

(1) To hold a special examination when the ship comes to a home port should any rating be qualified and ready to sit for examination. Notice should be given to this be paid by the Medical Officer of the ship so that the examination may be held immediately after the arrival of the ship

(2) To grant men the right leave when signalling the ship to enable them to attend for final examination at one of the recognised examination centres. Notice should be given to the hospital and the Medical Officer of the ship so that a special examination may be arranged

The [illegible] Article **387** of the [illegible] ment of [illegible] three years [illegible] It has been decided to [illegible] Sick Berth Staff [illegible] passed over [illegible] promotion [illegible] in the same manner as [illegible] passed finally

452.—Sick Berth Staff—Final Examination for Higher Ratings.

(M.D. 3290/15.—4.3.1915.)

In the case of members of the Sick Berth Staff about who are desirous of taking the final examination for a higher rating one of the following alternative methods should be adopted:—

(1) To hold a special examination at one ship or ships in a home port should any rating be qualified but unable to sit for examination. Notice should be given to the hospital by the Medical Officer of the ship so that the examination may be held immediately after the arrival of the ship.

To relieve men who are qualified and may wish to sit for examination when ashore relief is possible.

The Medical Officer of any ship having candidates on board should acquaint the Drafting Officer of the home depot that this is the case, and steps will then be taken for such men to be exchanged as soon as possible.

1208.—Surgeons—Promotion to Rank of Staff Surgeon.

(C.W. 30/7/15.)

During the present hostilities Surgeons who have served the necessary period for [illegible] and who have not had the opportunity of attending a promotion course at [illegible] which may provided they are recommended for advancement by the Director-General of the Medical Department be given the acting rank of Staff Surgeon. They will not be confirmed in rank until they have passed the usual examination, as in the event of an acting Staff Surgeon failing, to pass the examination when an opportunity occurs he will at once revert to the rank of Surgeon.

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Notices.

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